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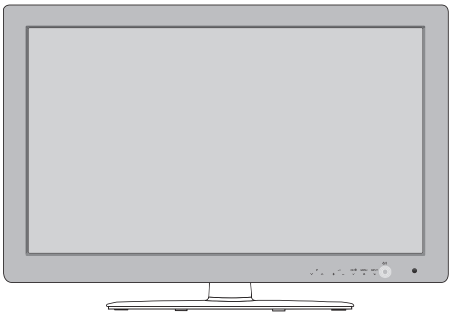
LED LCD TV
SERVICE MANUAL

CHASSIS : LD01A

MODEL : 26LE3300 26LE3308 26LE330N

26LE3300-ZA 26LE3308-ZA 26LE330N-ZA

CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



P/NO : MFL62863040 (1003-REV00)

Printed in Korea

CONTENTS

SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and Exploded View.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and it's components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

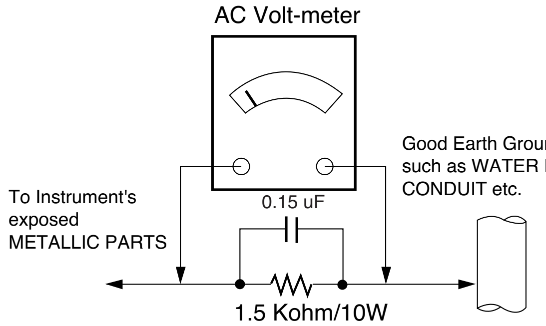
always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)
With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.
If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1 MΩ and 5.2 MΩ.
When the exposed metal has no return path to the chassis the reading must be infinite.
An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)
Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.
Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.
Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which is corresponds to 0.5 mA.
In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω
*Base on Adjustment standard

SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the SAFETY PRECAUTIONS on page 3 of this publication.
NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe.
   Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
   Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
   CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500 °F to 600 °F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle.
   Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
   b. Heat the component lead until the solder melts.
   c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
   a. Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
   b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

IC Remove/Replacement
Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal
1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement
1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush.
(It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor Removal/Replacement
1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device Removal/Replacement
1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement
1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor

Removal/Replacement
1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.
CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair
Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections
To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections
Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife.
Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side.
Carefully crimp and solder the connections.
CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. Application range

This specification is applied to the LED LCD TV used LD01A chassis.

2. Requirement for Test

Each part is tested as below without special appointment.

1) Temperature
   : 25 ºC ± 5 ºC (77 ºF ± 9 ºF), CST : 40 ºC ± 5 ºC
2) Relative Humidity : 65 % ± 10 %
3) Power Voltage
   : Standard input voltage (AC 100-240 V~ 50 / 60 Hz)
   * Standard Voltage of each products is marked by models.
4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
5) The receiver must be operated for about 5 minutes prior to the adjustment.

3. Test method

1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety: CE, IEC specification
   - EMC:CE, IEC

4. Module General Specification

No.	Item	Specification		Remark
1	Display Screen Device	66 cm(26 inch) wide color display module		LED LCD
2	Aspect Ratio	16:9		
3	LCD Module	66 cm(26 inch) TFT LCD Edge LED HD		
4	Storage Environment	Temp. : -20 deg ~ 60 deg		
		Humidity : 10 % ~ 90 %		
5	Input Voltage	AC 100-240 V~ 50 / 60 Hz		
6	Power Consumption	Power on (Blue)		LCD (Module) + Backlight(LED)
		LGD	Typ : 35.66 W	
8	Pixel Pitch	LGD	0.1405 mm x 0.4215 mm	
9	Back Light	Edge LED		
10	Display Colors	1.06 Billion(FHD LGD),16.7 M (others)		
11	Coating	3H, AG		

5. Module optical specification

No.	Item	Specification		Min.	Typ.	Max.	Remark
1.	Viewing Angle [CR>10]	Right/Left(Up/Down)		178			Degree
2.	Luminance	Luminance (cd/m^2)		320	400		
		Variation			-	1.3	MAX /MIN
3.	Contrast Ratio	CR		700	1000		
4.	CIE Color Coordinates	RED	Rx	Typ. -0.03	0.621	Typ. +0.03	
			Ry		0.345		
		Green	Gx		0.335		
			Gy		0.620		
		Blue	Bx		0.152		
			By		0.048		
		White	Wx		0.279		
			Wy		0.292		

1) Standard Test Condition (The unit has been 'ON')
2) Stable for approximately 30 minutes in a dark environment at 25 ºC ± 2 ºC.
3) The values specified are at approximate distance 50 cm from the LCD surface.
4) Ta= 25 ºC ± 2 ºC, VLCD= 5.0 V, fV= 60 Hz, Dclk= 74.25 MHz, $EXTV_{BR-B}$= 100 %

6. Component Video Input (Y, CB/PB, CR/PR)

No.	Specification				Remark
	Resolution	H-freq(kHz)	V-freq(Hz)		
1.	720x480	15.73	60.00	SDTV,DVD 480i	
2.	720x480	15.63	59.94	SDTV,DVD 480i	
3.	720x480	31.47	59.94	480p	
4.	720x480	31.50	60.00	480p	
5.	720x576	15.625	50.00	SDTV,DVD 625 Line	
6.	720x576	31.25	50.00	HDTV 576p	
7.	1280x720	45.00	50.00	HDTV 720p	
8.	1280x720	44.96	59.94	HDTV 720p	
9.	1280x720	45.00	60.00	HDTV 720p	
10.	1920x1080	31.25	50.00	HDTV 1080i	
11.	1920x1080	33.75	60.00	HDTV 1080i	
12.	1920x1080	33.72	59.94	HDTV 1080i	
13.	1920x1080	56.250	50	HDTV 1080p	
14.	1920x1080	67.5	60	HDTV 1080p	

7. RGB (PC)

No.	Specification				Proposed	Remark
	Resolution	H-freq(kHz)	V-freq(Hz)	Pixel Clock(MHz)		
1.	720*400	31.468	70.08	28.321		For only DOS mode
2.	640*480	31.469	59.94	25.17	VESA	Input 848*480 60 Hz, 852*480 60 Hz -> 640*480 60 Hz Display
3.	800*600	37.879	60.31	40.00	VESA	
4.	1024*768	48.363	60.00	65.00	VESA(XGA)	
5.	1280*768	47.78	59.87	79.5	WXGA	
6.	1360*768	47.72	59.8	84.75	WXGA	FHD Model
7.	1366*768	47.56	59.6	84.75	WXGA	WXGA Model
8.	1280*1024	63.595	60.0	108.875	SXGA	FHD model
9.	1280*720	45	60	74.25	720p	DTV Standard
10.	1920*1080	66.587	59.93	138.625	WUXGA	FHD model

8. HDMI Input

(1) DTV Mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1.	720*480	31.469 /31.5	59.94 /60	27.00/27.03	SDTV 480P	
2.	720*576	31.25	50	54	SDTV 576P	
3.	1280*720	37.500	50	74.25	HDTV 720P	
4.	1280*720	44.96 /45	59.94 /60	74.17/74.25	HDTV 720P	
5.	1920*1080	33.72 /33.75	59.94 /60	74.17/74.25	HDTV 1080I	
6.	1920*1080	28.125	50.00	74.25	HDTV 1080I	
7.	1920*1080	26.97 /27	23.97 /24	74.17/74.25	HDTV 1080P	
8.	1920*1080	33.716 /33.75	29.976 /30.00	74.25	HDTV 1080P	
9.	1920*1080	56.250	50	148.5	HDTV 1080P	
10.	1920*1080	67.43 /67.5	59.94 /60	148.35/148.50	HDTV 1080P	

(2) PC Mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1.	720*400	31.468	70.08	28.321		HDCP
2.	640*480	31.469	59.94	25.17	VESA	HDCP
3.	800*600	37.879	60.31	40.00	VESA	HDCP
4.	1024*768	48.363	60.00	65.00	VESA(XGA)	HDCP
5.	1280*768	47.78	59.87	79.5	WXGA	HDCP
6.	1360*768	47.72	59.8	84.75	WXGA	HDCP
7.	1440*1050	55.5	59.90	88.750	WSXGA	Not used(Moniter Panel)
8.	1400*1050	64.744	59.948	101.00	WSXGA	Not used(Moniter Panel)
9.	1680*1050	65.16	59.94	147.00	WSXGA	Not used(Moniter Panel)
10.	1280*1024	63.595	60.0	108.875	SXGA	HDCP/FHD model
11.	1920*1080	67.5	60.00	138.625	WUXGA	HDCP/FHD model

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to all of the LED LCD TV with LD01A chassis.

2. Designation

1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.
2) Power Adjustment: Free Voltage
3) Magnetic Field Condition: Nil.
4) Input signal Unit: Product Specification Standard
5) Reserve after operation: Above 5 Minutes (Heat Run)
   Temperature : at 25 °C ± 5 °C
   Relative humidity : 65 % ± 10 %
   Input voltage : 220 V, 60 Hz
6) Adjustment equipments: Color Analyzer(CA-210 or CA-110), DDC Adjustment Jig equipment, SVC remote control.
7) Push The “IN STOP” KEY - For memory initialization.

Case1 : Software version up
1. After downloading S/W by USB, TV set will reboot automatically
2. Push “In-stop” key
3. Push “Power on” key
4. Function inspection
5. After function inspection, Push “In-stop” key.

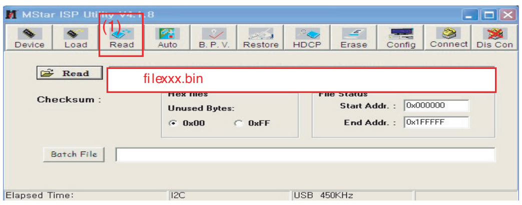
Case2 : Function check at the assembly line
1. When TV set is entering on the assembly line, Push “In-stop” key at first.
2. Push “Power on” key for turning it on.
   -> If you push “Power on” key, TV set will recover channel information by itself.
3. After function inspection, Push “In-stop” key.

3. Main PCB check process

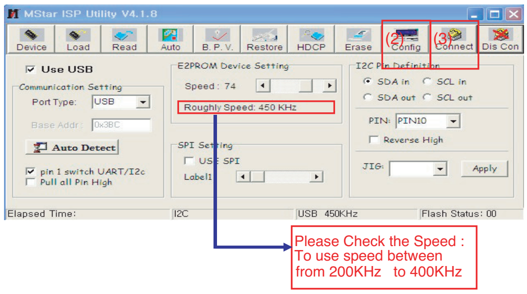
* APC - After Manual-Insult, executing APC

* Boot file Download

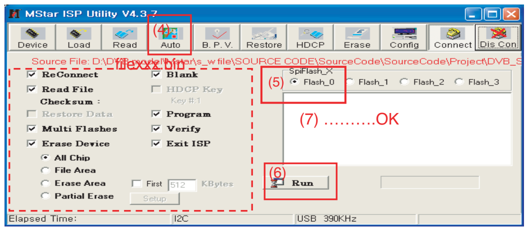
1) Execute ISP program “Mstar ISP Utility” and then click “Config” tab.



2) Set as below, and then click “Auto Detect” and check “OK” message
   If “Error” is displayed, Check connection between computer, jig, and set.
3) Click “Read” tab, and then load download file (XXXX.bin) by clicking “Read”
4) Click “Connect” tab. If “Can’t” is displayed, check connection between computer, jig, and set.

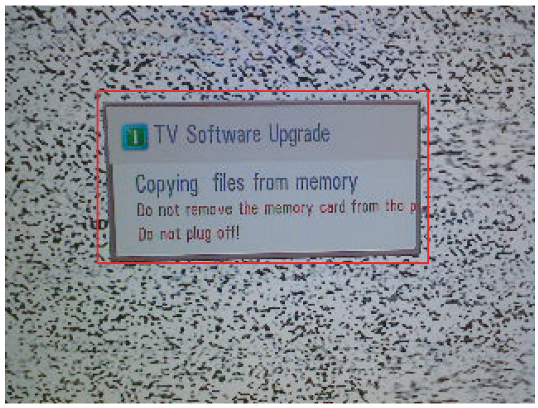


5) Click “Auto” tab and set as below
6) Click “Run”.
7) After downloading, check “OK” message.

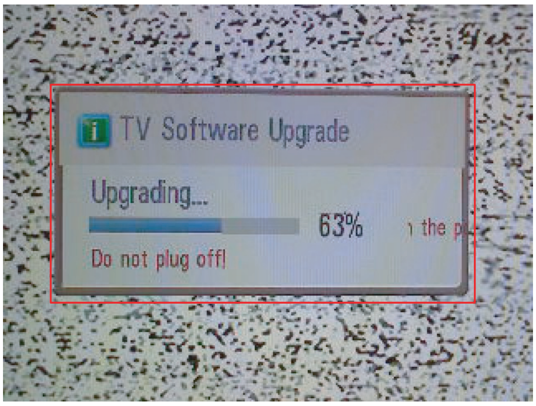


* USB DOWNLOAD

1) Put the USB Stick to the USB socket
2) Automatically detecting update file in USB Stick
   - If your downloaded program version in USB Stick is Low, it didn’t work. But your downloaded version is High, USB data is automatically detecting
3) Show the message “Copying files from memory”



4) Updating is staring.





5) Uploading completed, The TV will restart automatically.
6) If your TV is turned on, check your updated version and Tool option.(explain the Tool option, next stage)
   * If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.

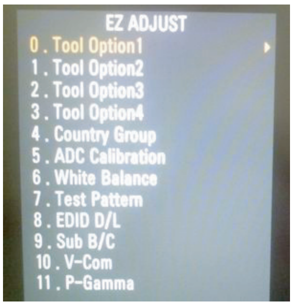
*** After downloading, have to adjust Tool Option again.**
1) Push "IN-START" key in service remote controller
2) Select "Tool Option 1" and Push "OK" button.
3) Punch in the number. (Each model hax their number)

Module	Tool option1	Tool option2	Tool option3	Tool option4	Tool optin5
LGD	12961	189188	53284	26893	0
AUO	12969	18988	53284	26893	0

4) Completed selecting Tool option.

3.1. ADC Process

(1) ADC
- Enter Service Mode by pushing "ADJ" key,
- Enter Internal ADC mode by pushing "▶" key at "5. ADC Calibration"





<Caution> Using 'power on' button of the Adjustment R/C, power on TV.

* ADC Calibration Protocol (RS232)

Item	CMD1	CMD2	Data0		
Adjust 'Mode In'	A	A	0	0	When transfer the 'Mode In', Carry the command.
ADC Adjust	A	D	1	0	Automatically adjustment (The use of a internal pattern)

Adjust Sequence
- aa 00 00 [Enter Adjust Mode]
- xb 00 40 [Component1 Input (480i)]
- ad 00 10 [Adjust 480i Comp1]
- xb 00 60 [RGB Input (1024*768)]
- ad 00 10 [Adjust 1024*768 RGB]
- aa 00 90 End Adjust mode

* Required equipment : Adjustment R/C.

3.2. Function Check

* Check display and sound
  - Check Input and Signal items. (cf. work instructions)
    1) TV
    2) AV (SCART1/SCART2/ CVBS)
    3) COMPONENT (480i)
    4) RGB (PC : 1024 x 768 @ 60 Hz)
    5) HDMI
    6) PC Audio In
    * Display and Sound check is executed by Remote control.

4. Total Assembly line process

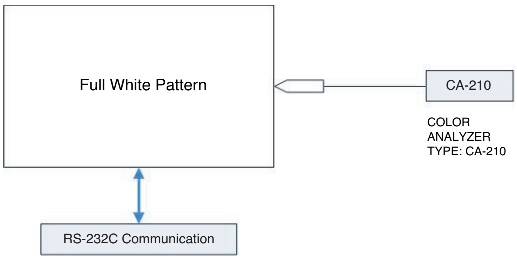
4.1. Adjustment Preparation

· W/B Equipment condition
CA210 : CH 9, Test signal : Inner pattern (85IRE)

· Above 5 minutes H/run in the inner pattern. (“power on” key of adjust remote control)

Cool	13,000	K	X=0.269(±0.002)	
			Y=0.273(±0.002)	<Test Signal>
Medium	9,300	K	X=0.285(±0.002)	Inner pattern
			Y=0.293(±0.002)	(216gray,85IRE)
Warm	6,500	K	X=0.313(±0.002)	
			Y=0.329(±0.002)	

* Connecting picture of the measuring instrument
(On Automatic control)
Inside PATTERN is used when W/B is controlled. Connect to auto controller or push Adjustment R/C POWER ON -> Enter the mode of White-Balance, the pattern will come out.



* Auto-control interface and directions

1) Adjust in the place where the influx of light like floodlight around is blocked. (illumination is less than 10 lux).
2) Adhere closely the Color Analyzer (CA210) to the module less than 10 cm distance, keep it with the surface of the Module and Color Analyzer’s prove vertically.(80° ~ 100°).
3) Aging time
   - After aging start, keep the power on (no suspension of power supply) and heat-run over 5 minutes.
   - Using ‘no signal’ or ‘full white pattern’ or the others, check the back light on.

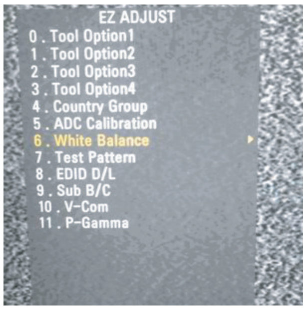
• Auto adjustment Map(RS-232C)
RS-232C COMMAND
[CMD ID DATA]
Wb 00 00 White Balance Start
Wb 00 ff White Balance End

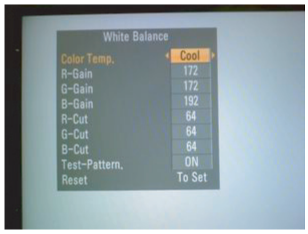
	RS-232C COMMAND [CMD ID DATA]			MIN	CENTER (DEFAULT)			MAX
	Cool	Mid	Warm		Cool	Mid	Warm	
R Gain	jg	Ja	jd	00	172	192	192	192
G Gain	jh	Jb	je	00	172	192	192	192
B Gain	ji	Jc	jf	00	192	192	172	192
R Cut					64	64	64	128
G Cut					64	64	64	128
B Cut					64	64	64	128

** Caution **
Color Temperature : COOL, Medium, Warm.
One of R Gain/G Gain/ B Gain should be kept on 0xC0, and adjust other two lower than C0.
(when R/G/B Gain are all C0, it is the FULL Dynamic Range of Module)

* Manual W/B process using adjusts Remote control.

• After enter Service Mode by pushing “ADJ” key,
• Enter White Balance by pushing “►” key at “6. White Balance”.





* After done all adjustments, Press “In-start” button and compare Tool option and Area option value with its BOM, if it is correctly same then unplug the AC cable. If it is not same, then correct it same with BOM and unplug AC cable. For correct it to the model’s module from factory JIG model.

* Push the “IN STOP” key after completing the function inspection. And Mechanical Power Switch must be set “ON”.

4.2. DDC EDID Write (RGB 128Byte)

• Connect D-sub Signal Cable to D-sub Jack.
• Write EDID Data to EEPROM(24C02) by using DDC2B protocol.
• Check whether written EDID data is correct or not.

* For SVC main Assembly, EDID have to be downloaded to Insert Process in advance.

4.3. DDC EDID Write (HDMI 256Byte)

• Connect HDMI Signal Cable to HDMI Jack.
• Write EDID Data to EEPROM(24C02) by using DDC2B protocol.
• Check whether written EDID data is correct or not.

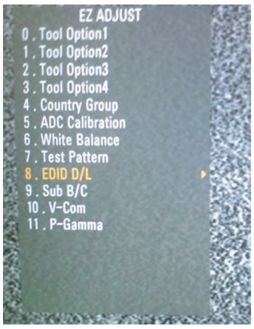
* For SVC main Assembly, EDID have to be downloaded to Insert Process in advance.

4.4. EDID DATA

1) All Data : HEXA Value
2) Changeable Data :
*: Serial No : Controlled / Data:01
**: Month : Controlled / Data:00
***:Year : Controlled
****:Check sum

- Auto Download

• After enter Service Mode by pushing “ADJ” key,
• Enter EDID D/L mode.
• Enter “START” by pushing “OK” key.







* Edid data and Model option download (RS232)

Item	CMD1	CMD2	Data0		
Download 'Mode In'	A	A	0	0	When transfer the 'Mode In', Carry the command.
Download	A	E	00	10	Automatically Download (The use of a internal pattern)

- Manual Download

* Caution
1) Use the proper signal cable for EDID Download
   - Analog EDID : Pin3 exists
   - Digital EDID : Pin3 exists
2) Never connect HDMI & D-sub Cable at the same time.
3) Use the proper cables below for EDID Writing
4) Download HDMI1, HDMI2, separately because HDMI1 is different from HDMI2

For Analog EDID	For HDMI EDID	
D-sub to D-sub	DVI-D to HDMI or HDMI to HDMI	
		

Item	Condition	Data(Hex)
Manufacturer ID	GSM	1E6D
Version	Digital : 1	01
Revision	Digital : 3	03

1) HD RGB EDID data

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	ⓐ		ⓑ			
10	ⓒ		01	03	68	73	41	78	0A	CF	74	A3	57	4C	B0	23
20	09	48	4C	A1	08	00	81	C0	61	40	45	40	31	40	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	7E	8A	42	00	00	1E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	7E	8A	42	00	00	1E	00	00	00	FD	00	3A
60	3E	1F	46	10	00	0A	20	20	20	20	20	20	ⓓ			
70	ⓓ														00	ⓔ
80	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
90	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
A0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
B0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
C0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
D0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
E0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF
F0	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF

2) HD HDMI EDID data

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	ⓐ		ⓑ			
10	ⓒ		01	03	80	73	41	78	0A	CF	74	A3	57	4C	B0	23
20	09	48	4C	A1	08	00	81	C0	61	40	45	40	31	40	01	01
30	01	01	01	01	01	01	66	21	50	B0	51	00	1B	30	40	70
40	36	00	7E	8A	42	00	00	1E	01	1D	00	72	51	D0	1E	20
50	6E	28	55	00	7E	8A	42	00	00	1E	00	00	00	FD	00	3A
60	3E	1F	46	10	00	0A	20	20	20	20	20	20	ⓓ			
70	ⓓ														01	ⓔ
80	02	03	20	F1	4E	10	1F	84	13	05	14	03	02	12	20	21
90	22	15	01	26	15	07	50	09	57	07	ⓕ					
A0	ⓕ		80	18	71	1C	16	20	58	2C	25	00	7E	8A	42	00
B0	00	9E	01	1D	00	80	51	D0	0C	20	40	80	35	00	7E	8A
C0	42	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00
D0	7E	8A	42	00	00	18	02	3A	80	18	71	38	2D	40	58	2C
E0	45	00	7E	8A	42	00	00	1E	01	1D	80	D0	72	1C	16	20
F0	10	2C	25	80	7E	8A	42	00	00	9E	00	00	00	00	00	D5

* Detail EDID Options are below

ⓐ Product ID

Model Name	HEX	EDID Table	DDC Function
HD Model	0000	00 00	Analog/Digital

ⓑ Serial No: Controlled on production line.

ⓒ Month, Year: Controlled on production line:
ex) Monthly : '02' -> '02'
Year : '2009' -> '13'

ⓓ Model Name(Hex):

MODEL	MODEL NAME(HEX)
all	00 00 00 FC 00 4C 47 20 54 56 0A 20 20 20 20 20 20 20

ⓔ Checksum: Changeable by total EDID data.

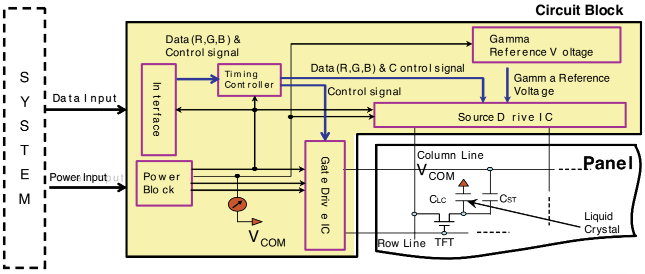
ⓕ Vendor Specific(HDMI)

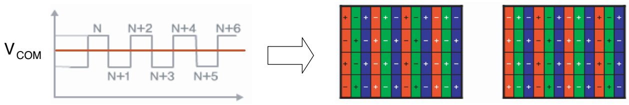
INPUT	MODEL NAME(HEX)
HDMI1	65030C001000011D
HDMI2	65030C002000011D
HDMI3	65030C003000011D

4.5. V-COM Adjust(Only LGD(M+S) Module)

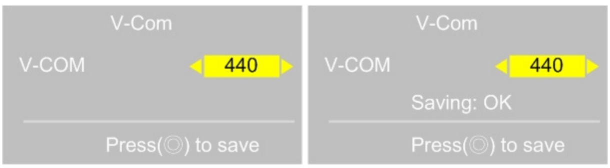
- Why need Vcom adjustment?

■ The Vcom (Common Voltage) is a Reference Voltage of Liquid Crystal Driving.
-> Liquid Crystal need for Polarity Change with every frame.





- Adjust sequence
  · Press the PIP key of th ADJ remote control.(This PIP key is hot key to enter the VCOM adjuting mode)
  (Or After enter Service Mode by pushing "ADJ" key, then Enter V-Com Adjust mode by pushing "▶" key at "10. V-Com")
  · As pushing the right or the left key on the remote control, and find the V-COM value which is no or minimized the Flicker. (If there is no flicker at default value, Press the exit key and finish the VCOM adjustment.)
  · Push the "OK" key to store value. Then the message "Saing OK" is pop.
  · Press the exit key to finish VCOM adjustment.



(Visual Adjust and control the Voltage level)

4.6. Outgoing condition Configuration

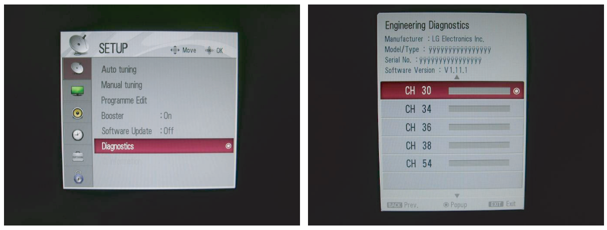
- When pressing IN-STOP key by SVC remocon, Red LED are blinked alternatively. And then Automatically turn off.
(Must not AC power OFF during blinking)

4.7. Internal pressure

Confirm whether is normal or not when between power board's ac block and GND is impacted on 1.5 kV(dc) or 2.2 kV(dc) for one second.

5. Model name & Serial number D/L

• Press "Power on" key of service remocon.
(Baud rate : 115200 bps)
• Connect RS232 Signal Cable to RS-232 Jack.
• Write Serial number by use RS-232.
• Must check the serial number at the Diagnostics of SET UP menu. (Refer to below).



5.1. Signal TABLE

CMD	LENGTH	ADH	ADL	DATA_1	...	Data_n	CS	DELAY

CMD : A0h
LENGTH : 85~94h (1~16 bytes)
ADH : EEPROM Sub Address high (00~1F)
ADL : EEPROM Sub Address low (00~FF)
Data : Write data
CS : CMD + LENGTH + ADH + ADL + Data_1 +…+ Data_n
Delay : 20ms

5.2. Command Set

No.	Adjust mode	CMD(hex)	LENGTH(hex)	Description
1	EEPROM WRITE	A0h	84h+n	n-bytes Write (n = 1~16)

* Description
FOS Default write : <7mode data> write
Vtotal, V_Frequency, Sync_Polarity, Htotal, Hstart, Vstart, 0, Phase
Data write : Model Name and Serial Number write in EEPROM,.

5.3. Method & notice

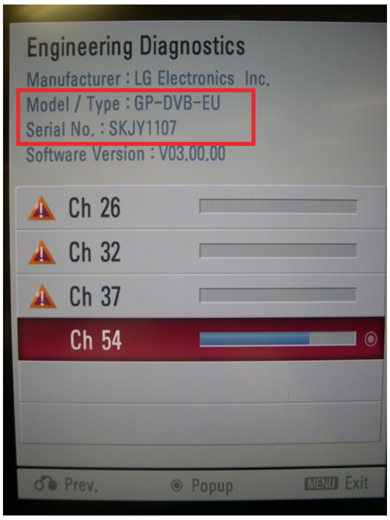
A. Serial number D/L is using of scan equipment.
B. Setting of scan equipment operated by Manufacturing Technology Group.
C. Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.

* Manual Download (Model Name and Serial Number)
If the TV set is downloaded by OTA or Service man, Sometimes model name or serial number is initialized.(Not always)
There is impossible to download by bar code scan, so It need Manual download.
1) Press the ‘instart’ key of ADJ remote controller.
2) Go to the menu ‘5.Model Number D/L’ like below photo.
3) Input the Factory model name(ex 42LD450-ZA) or Serial number like photo.

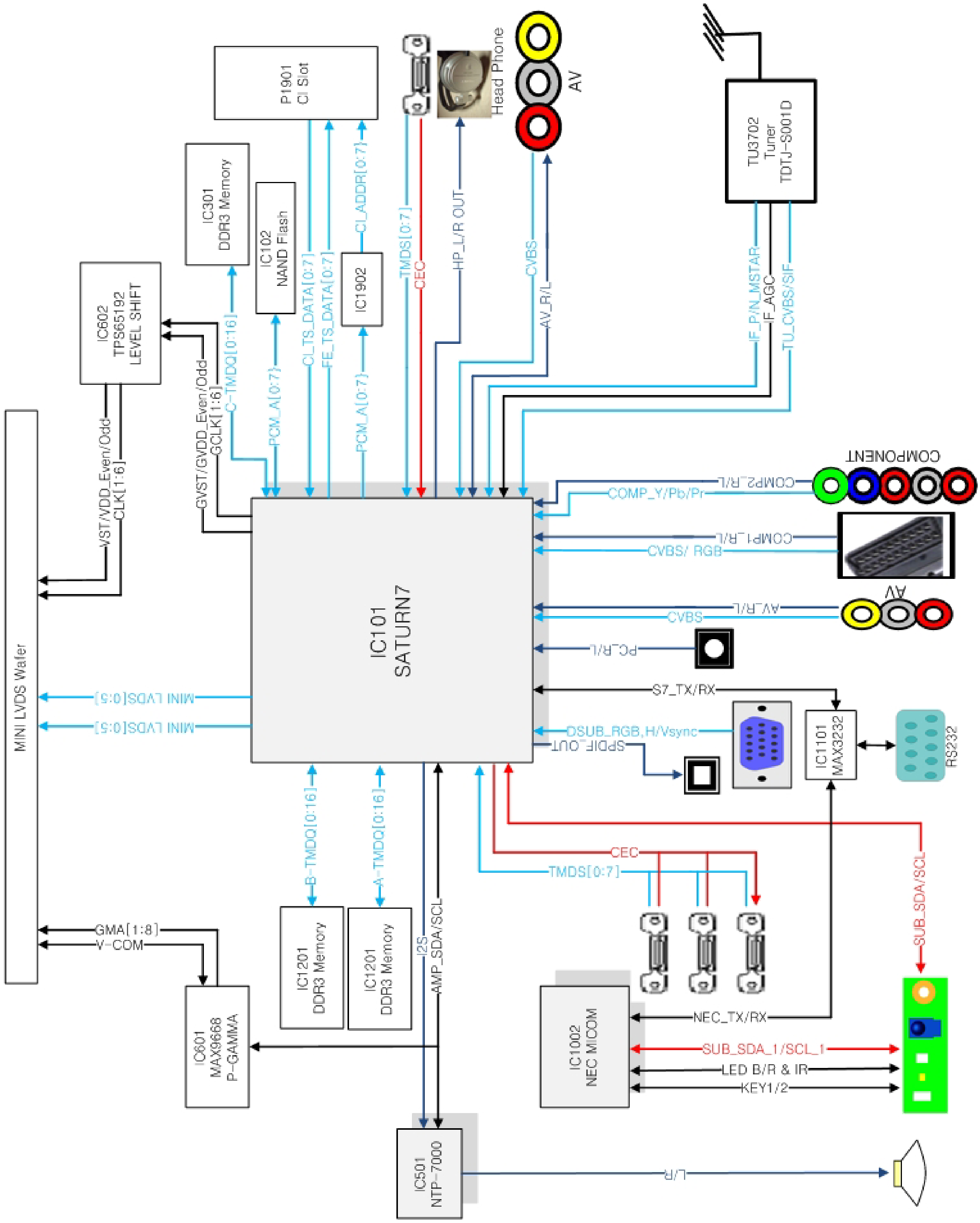




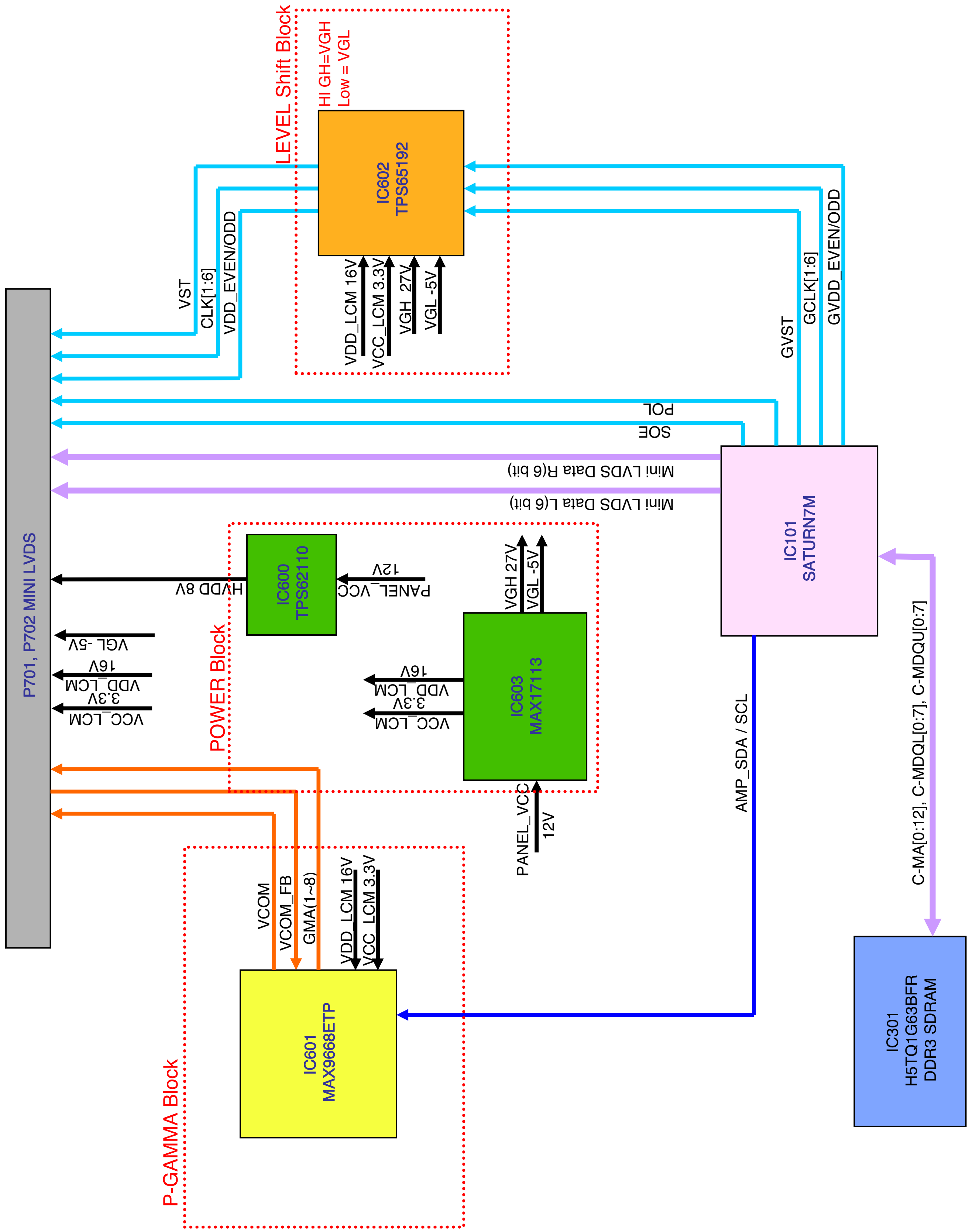
4) Check the model name Instart menu -> Factory name displayed (ex 42LD450-ZA)
5) Check the Diagnostics (DTV country only) -> Buyer model displayed (ex 42LD450)



BLOCK DIAGRAM



GIP Model

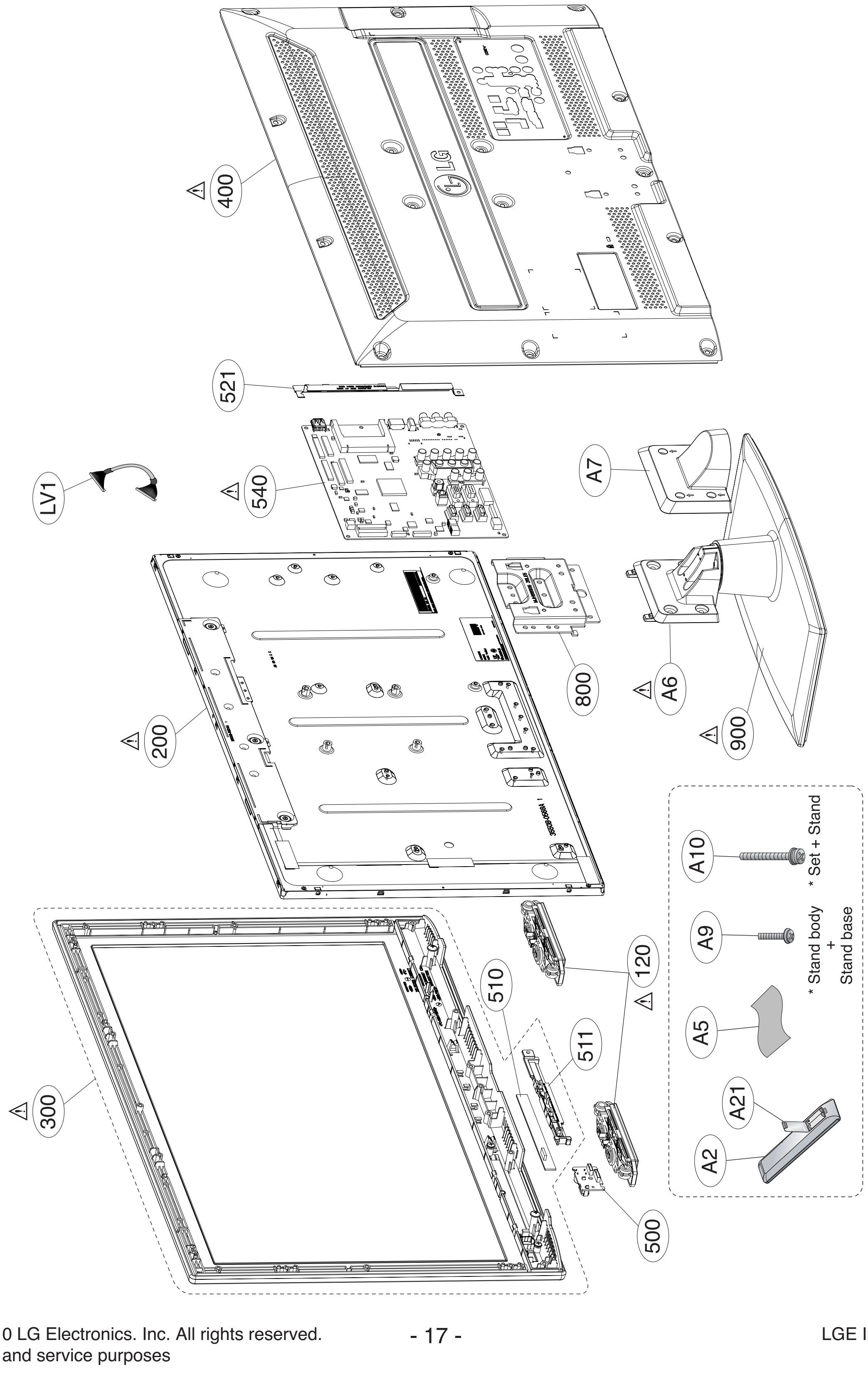


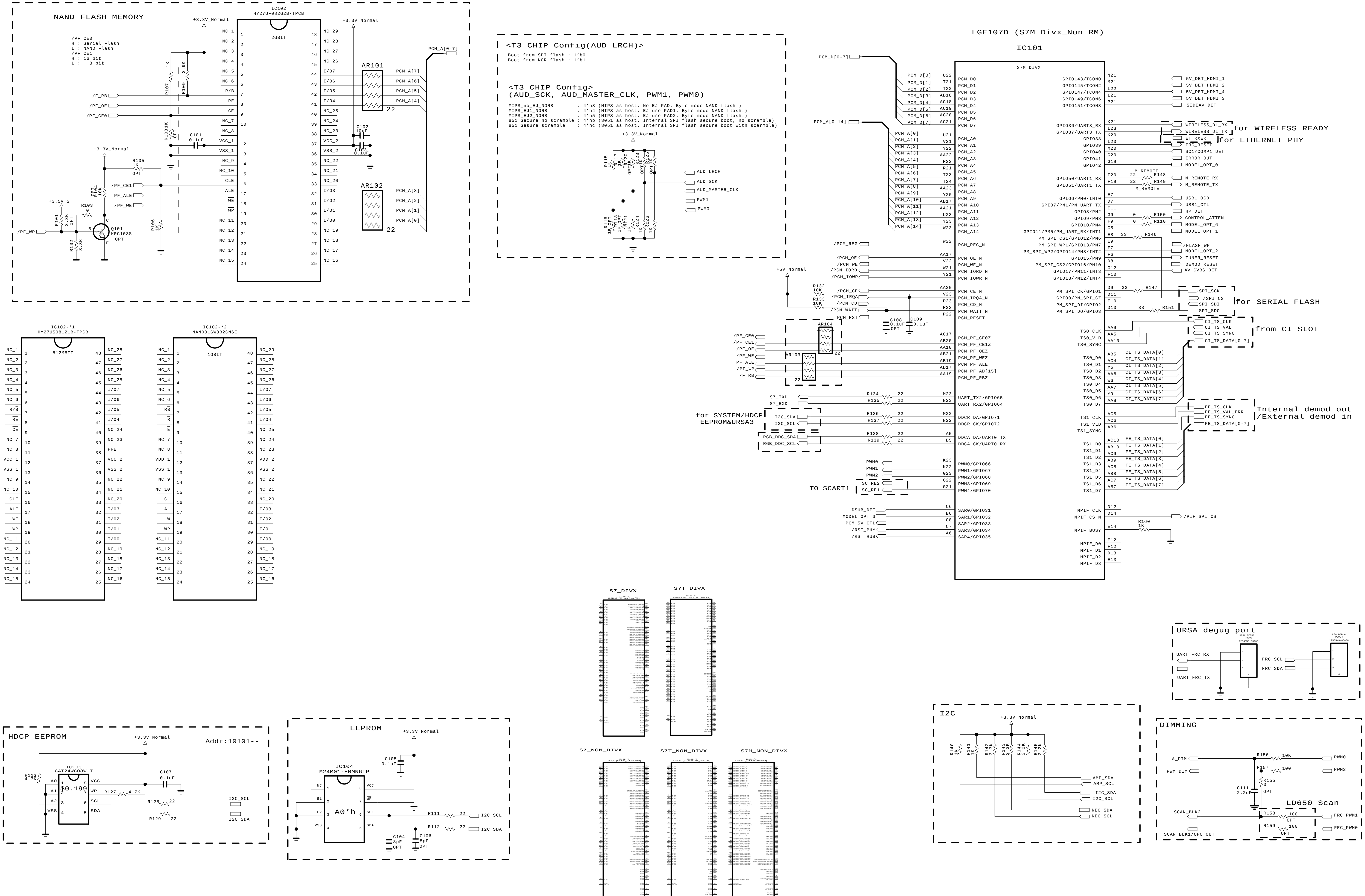
LEVEL Shift Block
HI GH=VGH
Low = VGL
IC602
TPS65192
VST
CLK[1:6]
VDD_EVEN/ODD
VDD_LCM 16V
VCC_LCM 3.3V
VGH 27V
VGL -5V
GVST
GCLK[1:6]
GVDD_EVEN/ODD
POL
SOE
Mini LVDS Data R(6 bit)
Mini LVDS Data L(6 bit)
IC101
SATURN7M
P701, P702 MINI LVDS
POWER Block
IC600
TPS62110
HVDD 8V
PANEL_VCC
12V
VGL -5V
VDD_LCM
16V
VCC_LCM
3.3V
IC603
MAX17113
VGH 27V
VGL -5V
PANEL_VCC
12V
AMP_SDA / SCL
C-MA[0:12], C-MDQL[0:7], C-MDQU[0:7]
IC301
H5TQ1G63BFR
DDR3 SDRAM
P-GAMMA Block
IC601
MAX9668ETP
VCOM
VCOM_FB
GMA(1~8)
VDD_LCM 16V
VCC_LCM 3.3V

EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by ⚠ in the Schematic Diagram and EXPLODED VIEW.
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.
Do not modify the original design without permission of manufacturer.



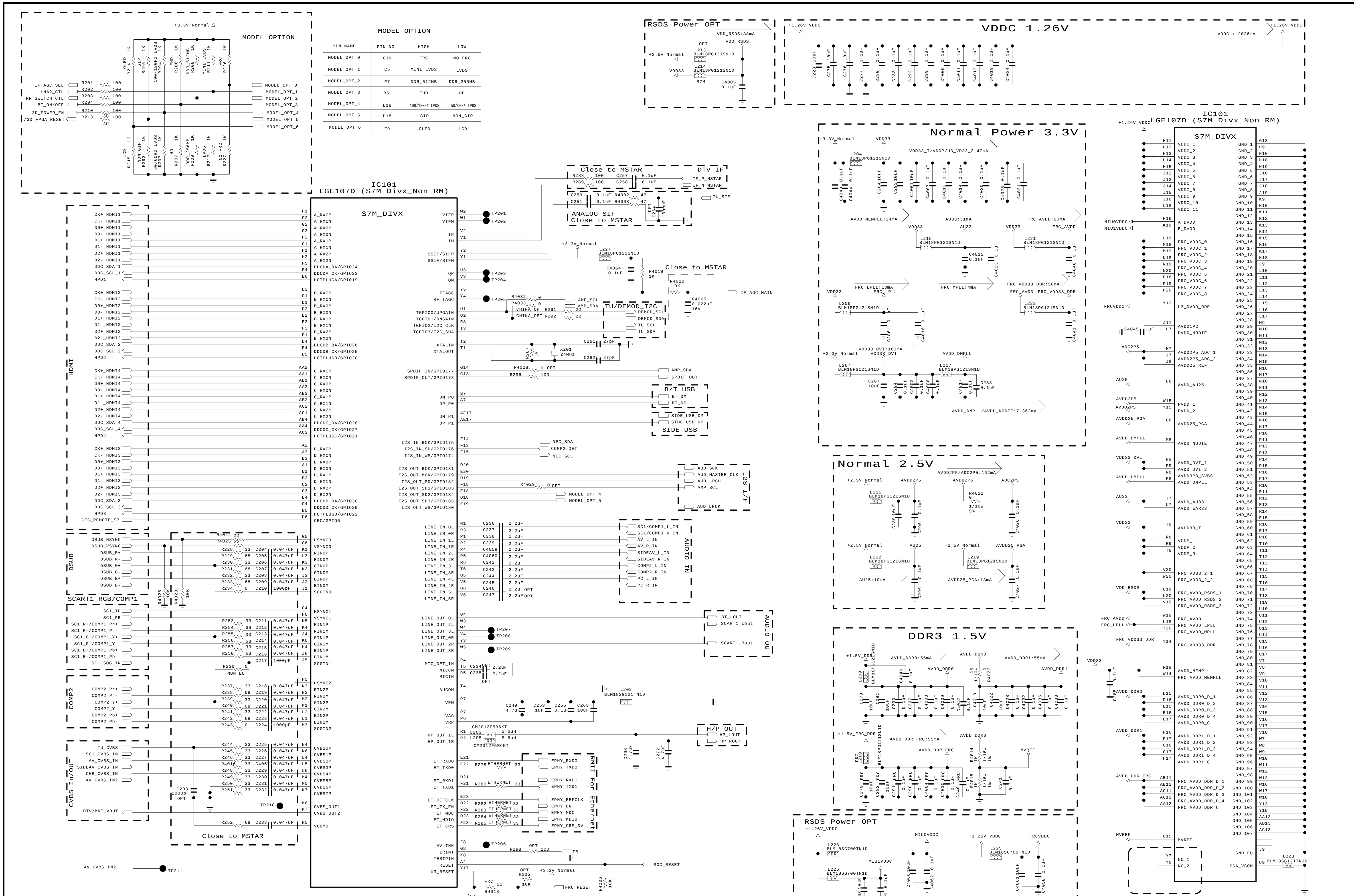


THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.3
BLOCK	FLASH/EEPROM/GPIO	SHEET	1 /



MODEL OPTION

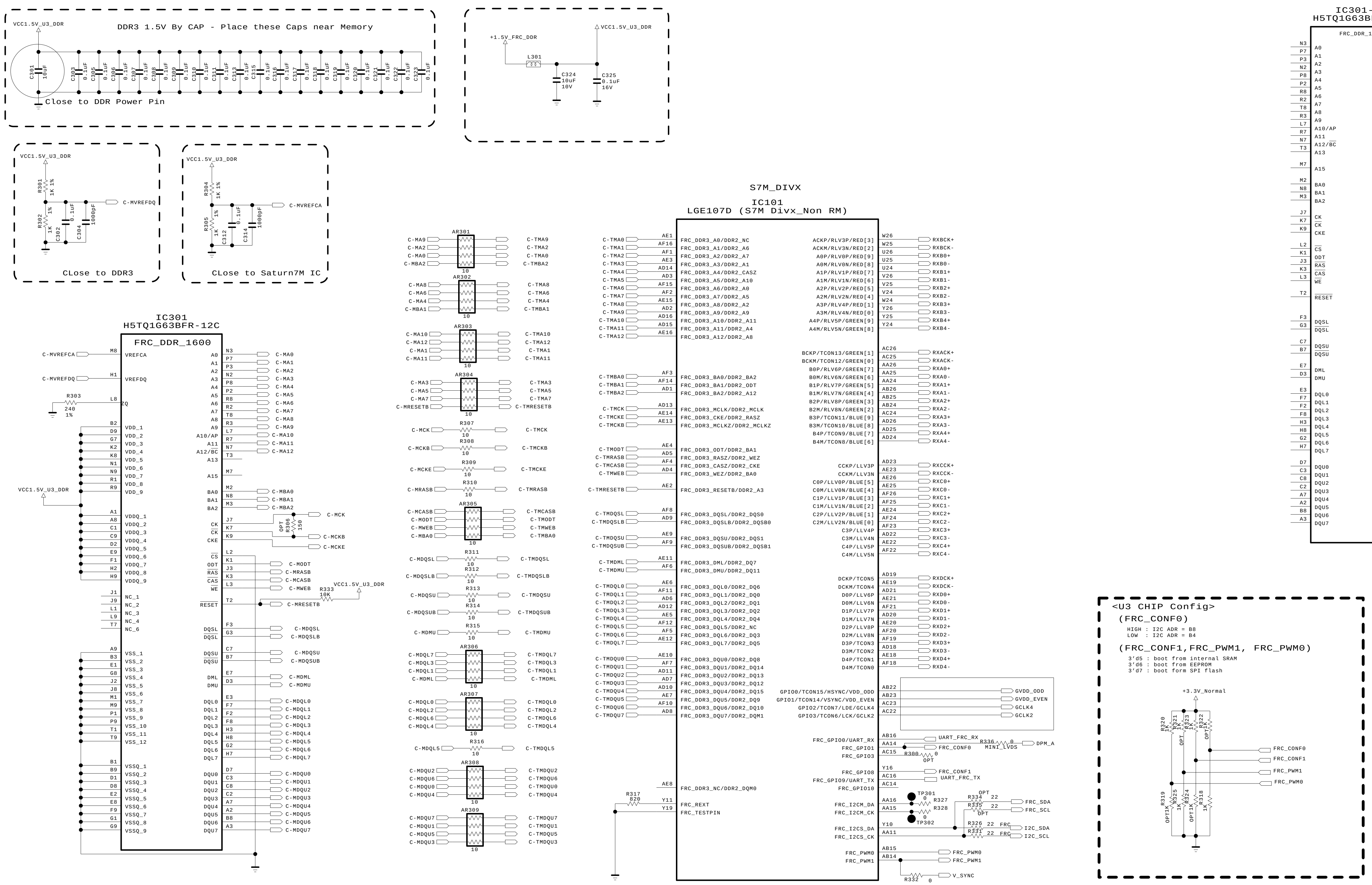
PIN NAME	PIN NO.	HIGH	LOW
MODEL_OPT_0	G19	FRC	NO FRC
MODEL_OPT_1	C5	MINI LVDS	LVDS
MODEL_OPT_2	F7	DDR_512MB	DDR_256MB
MODEL_OPT_3	B6	FHD	HD
MODEL_OPT_4	E18	100/120Hz LVDS	50/60Hz LVDS
MODEL_OPT_5	D18	GIP	NON_GIP
MODEL_OPT_6	F9	OLED	LCD

THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

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MODEL	GP2_Saturn7M	DATE	Ver. 1.4
BLOCK	MAIN_2	SHEET	2



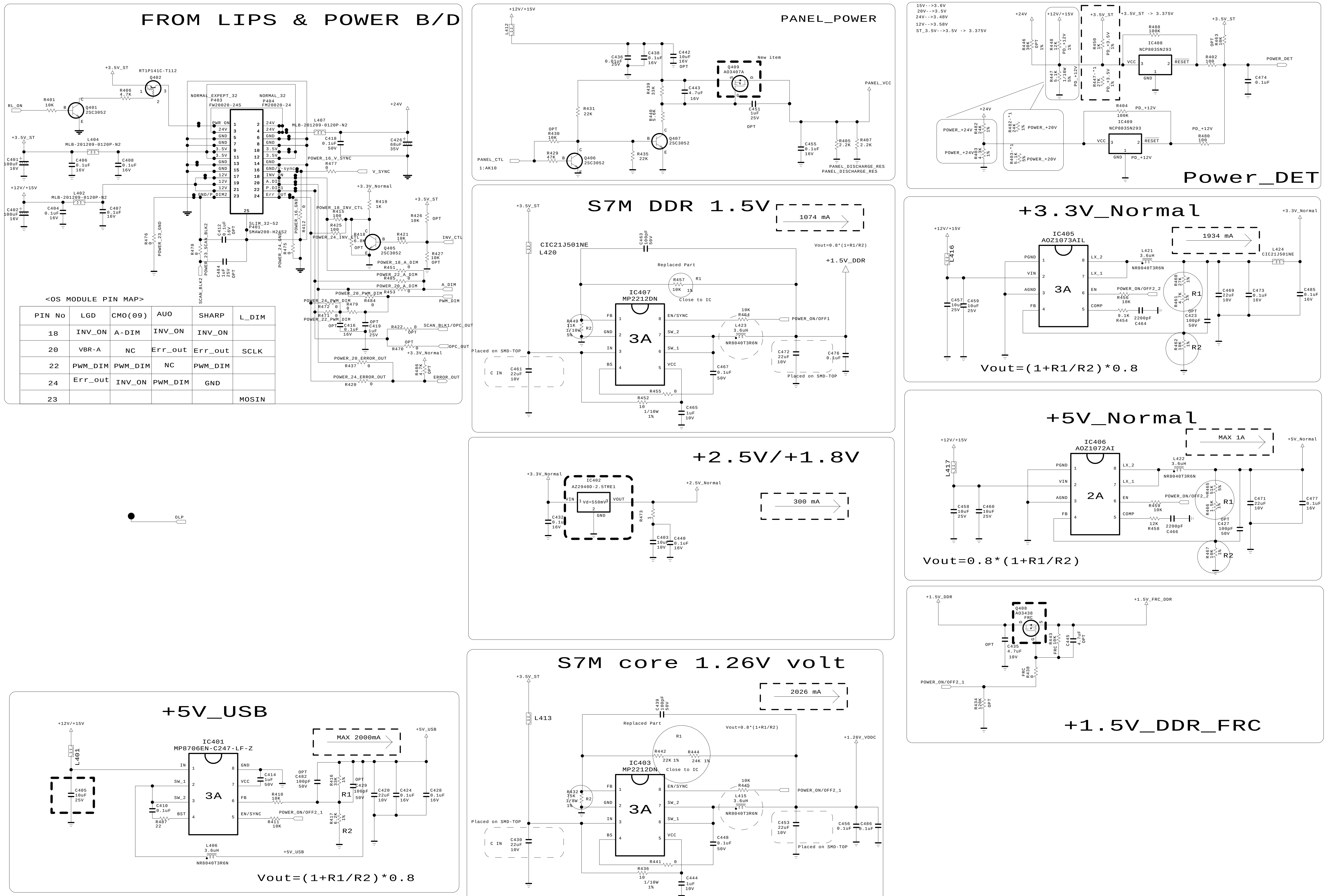
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET

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LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.4
BLOCK	DDR3(FRC)	SHEET	3 /



<OS MODULE PIN MAP>

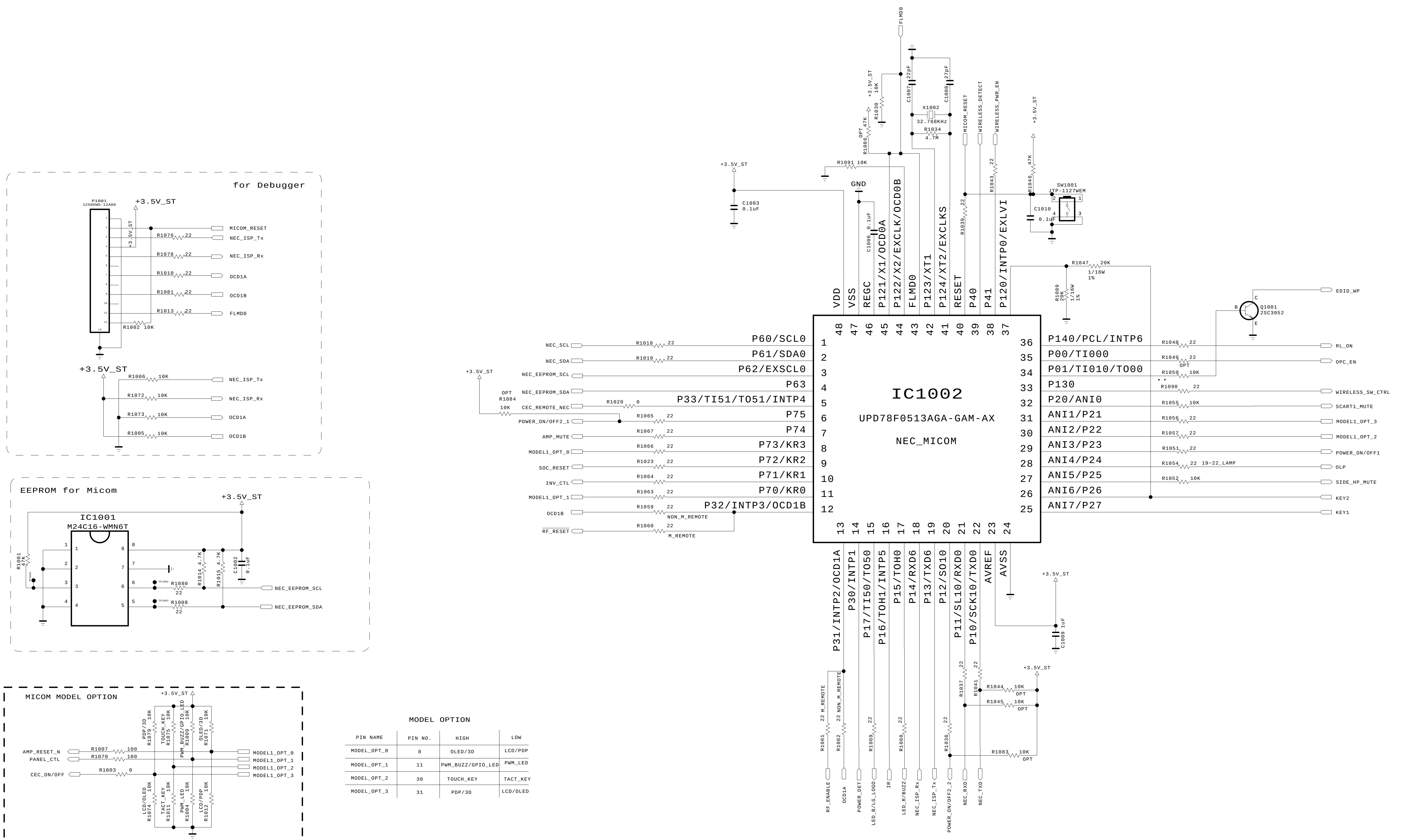
PIN No	LGD	CMO(09)	AUO	SHARP	L_DIM
18	INV_ON	A-DIM	INV_ON	INV_ON	
20	VBR-A	NC	Err_out	Err_out	SCLK
22	PWM_DIM	PWM_DIM	NC	PWM_DIM	
24	Err_out	INV_ON	PWM_DIM	GND	
23					MOSIN

THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

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LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.2
BLOCK	POWER	SHEET	4 /



MODEL OPTION

PIN NAME	PIN NO.	HIGH	LOW
MODEL_OPT_0	8	OLED/3D	LCD/PDP
MODEL_OPT_1	11	PWM_BUZZ/GPIO_LED	PWM_LED
MODEL_OPT_2	30	TOUCH_KEY	TACT_KEY
MODEL_OPT_3	31	PDP/3D	LCD/OLED

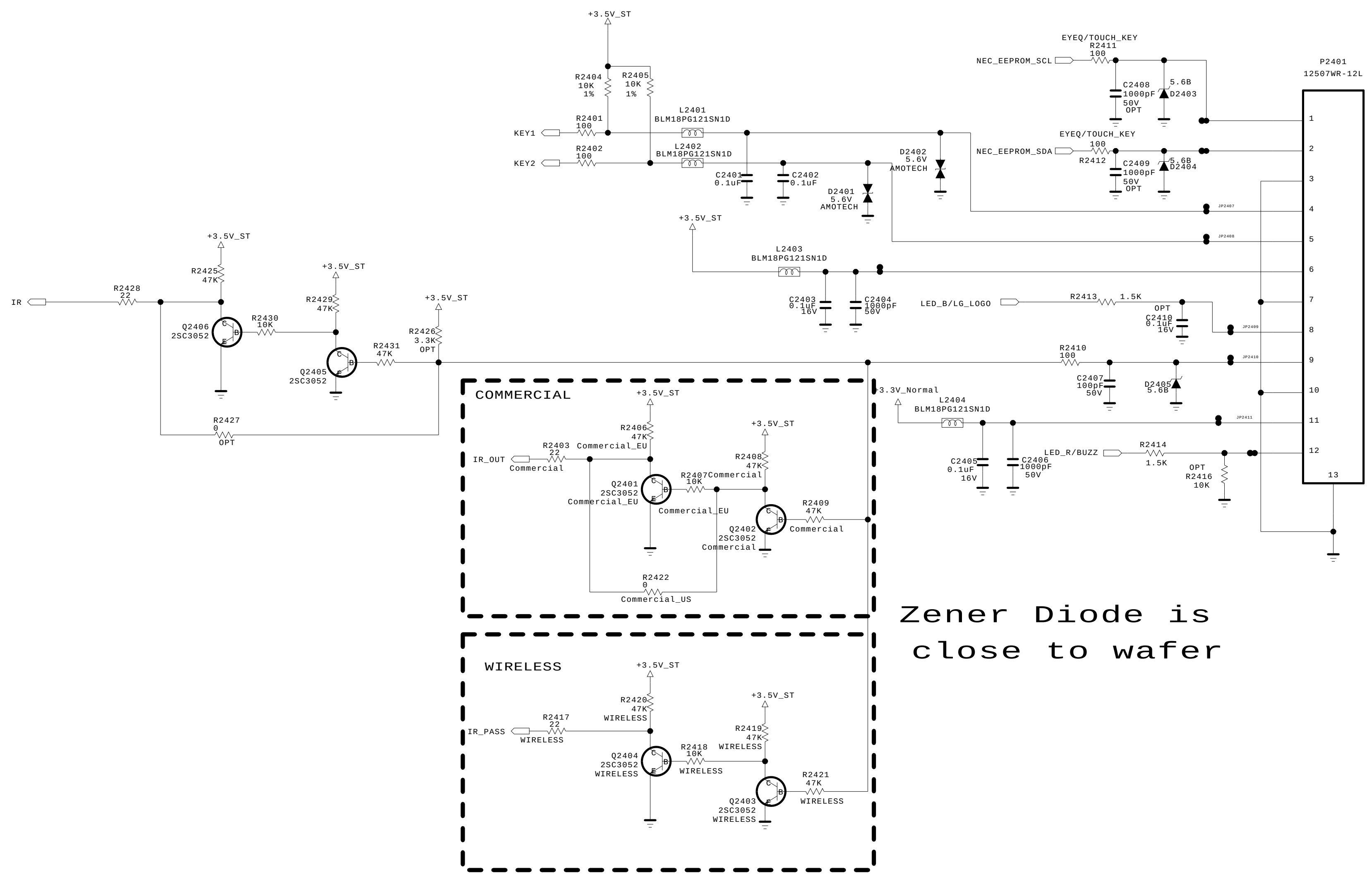
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

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LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.4
BLOCK	MICOM	SHEET	5 /

CONTROL
IR & LED

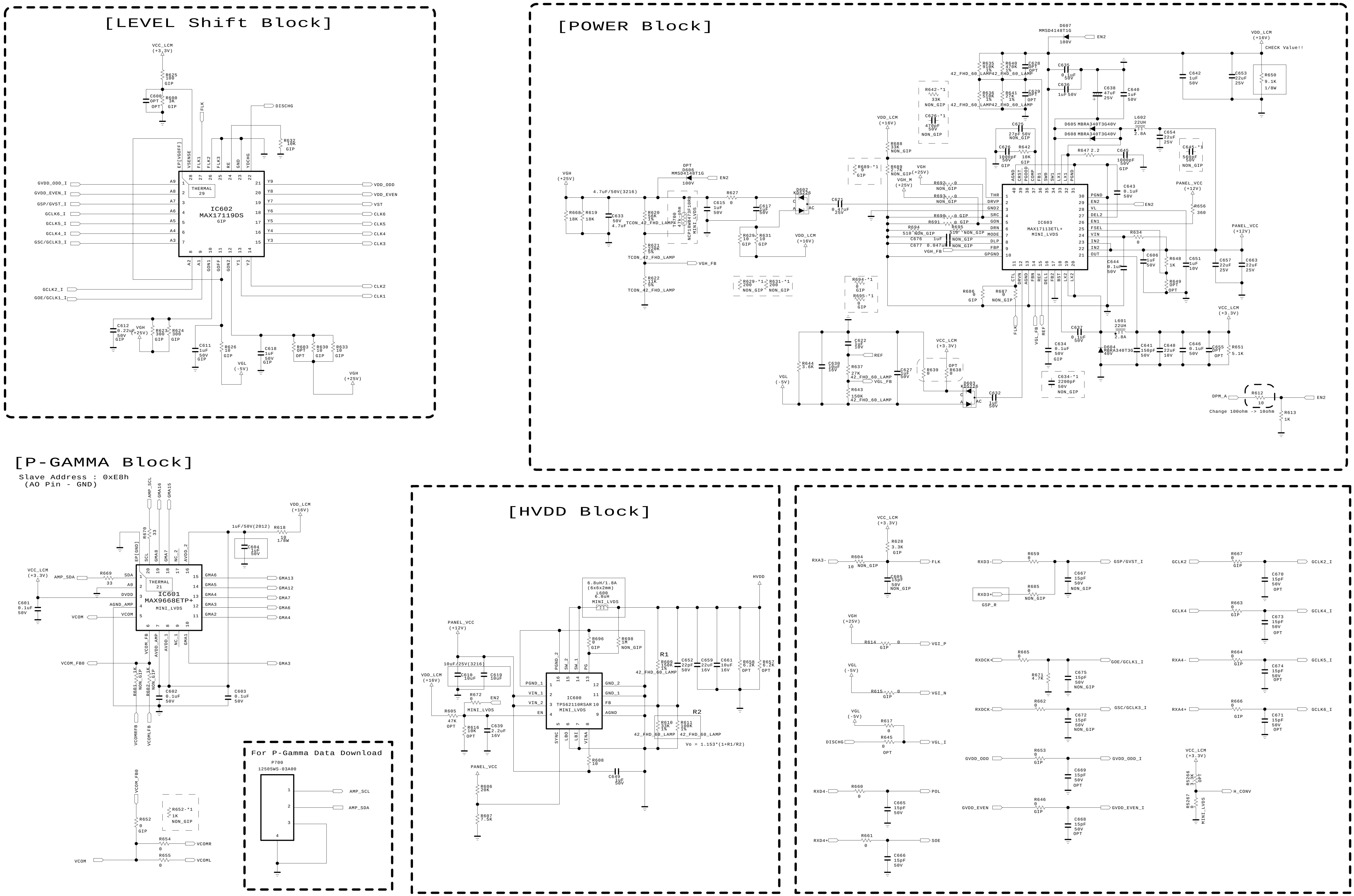


THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

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LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.2
BLOCK	IR & LED	SHEET	6 /

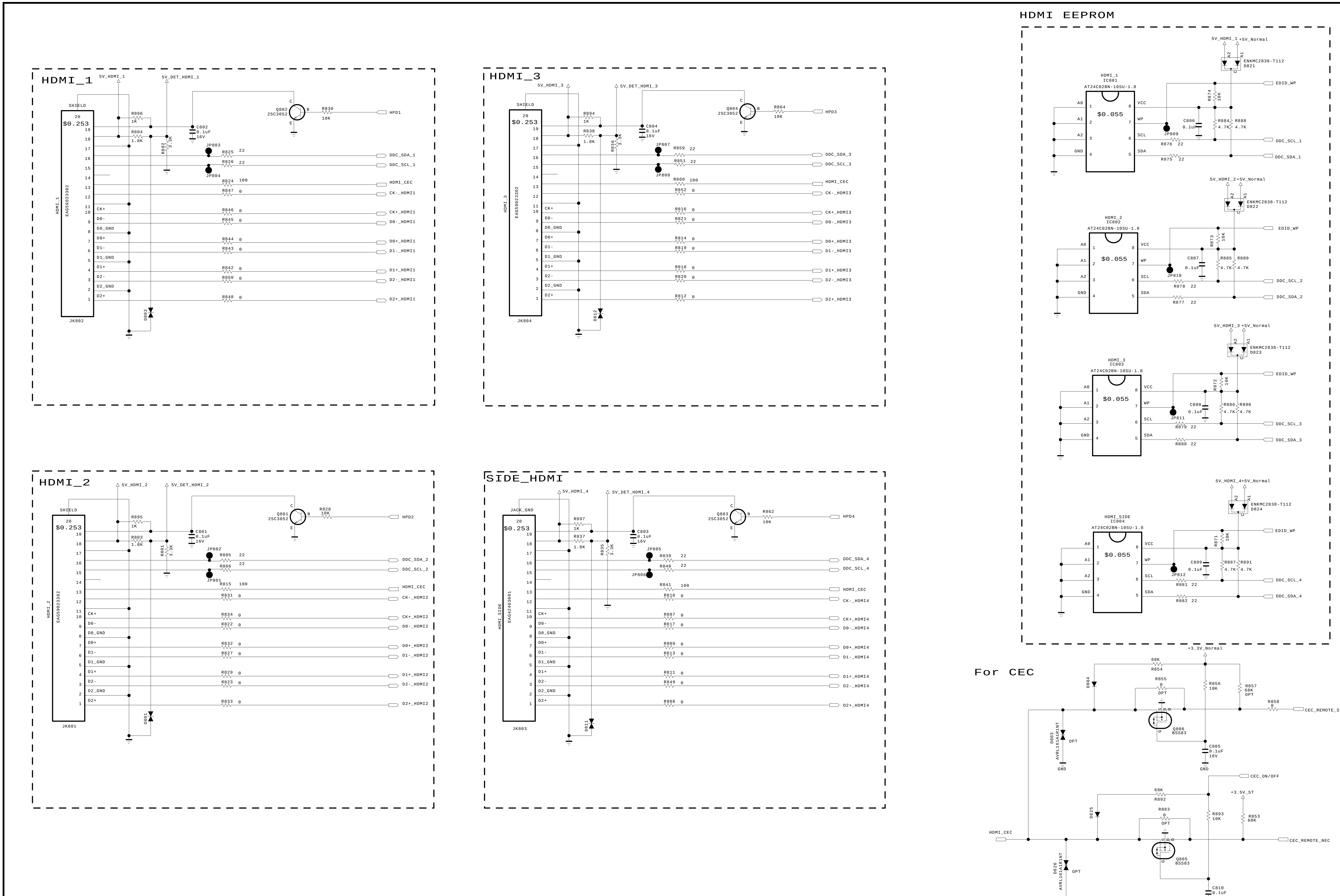


THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

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LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 2.0
BLOCK	T-CON	SHEET	7



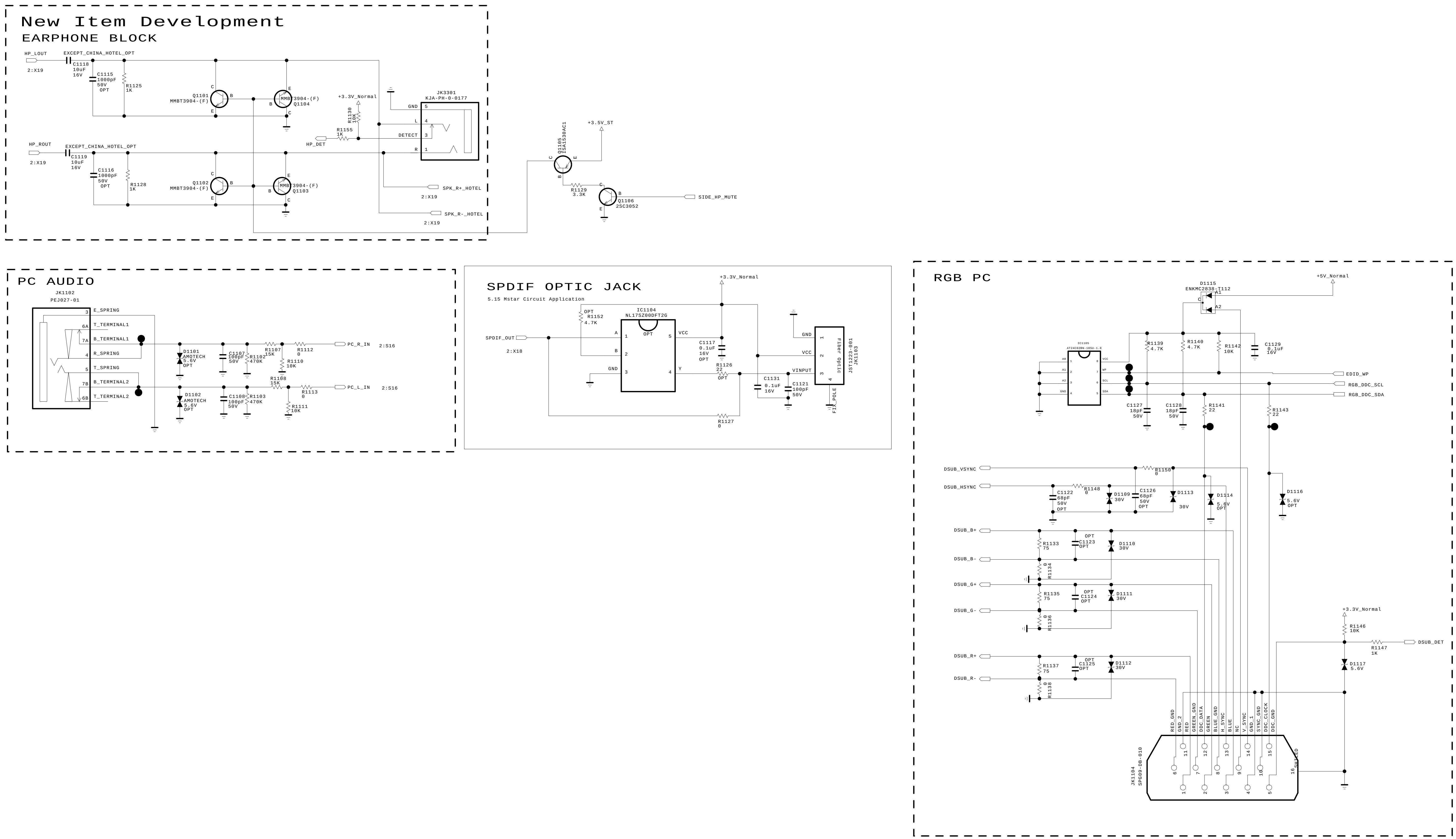
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

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LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.2
BLOCK	HDMI	SHEET	8 /

COMMON AREA

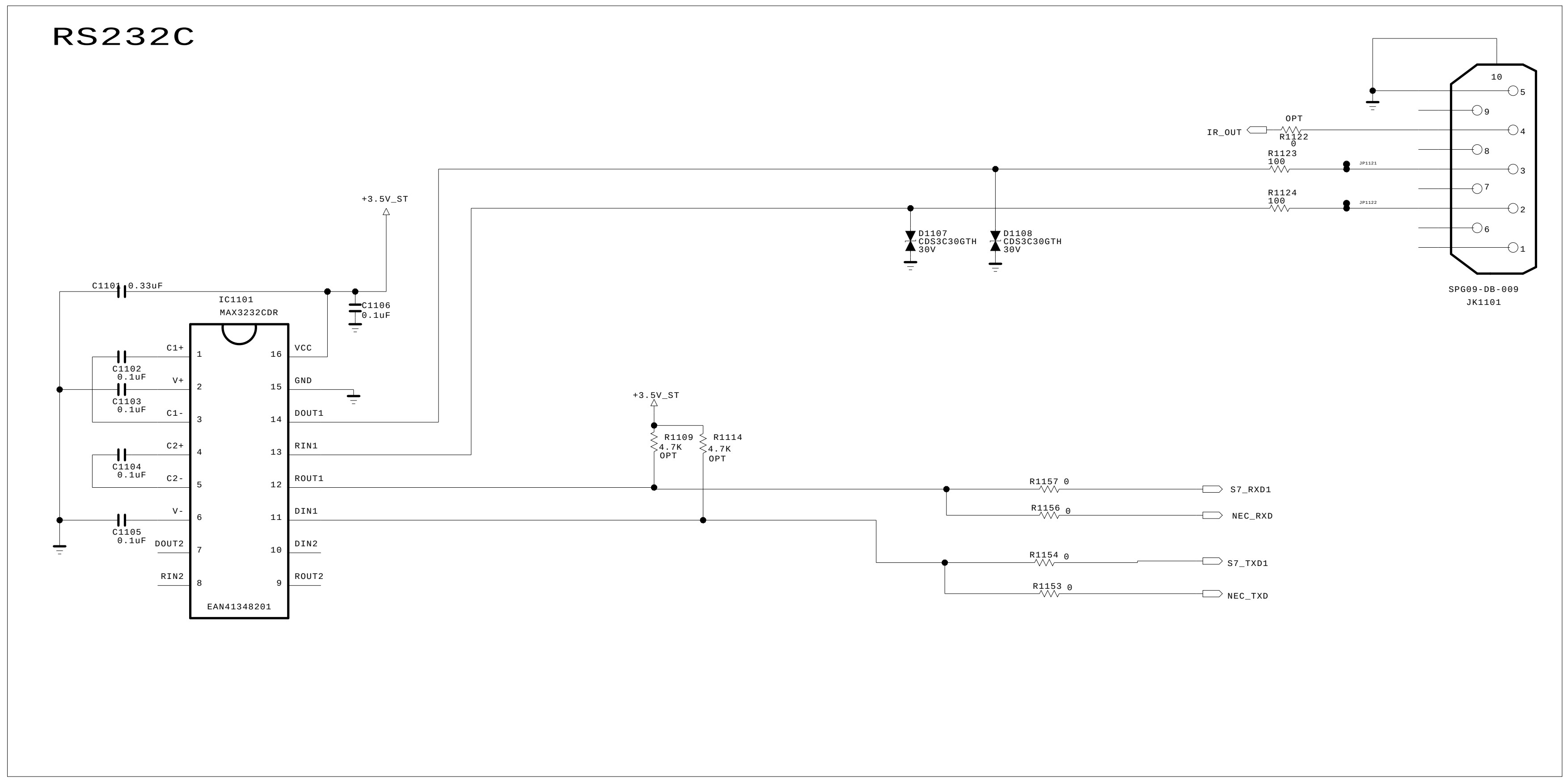


THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LG Electronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	COMMON AREA	SHEET	9

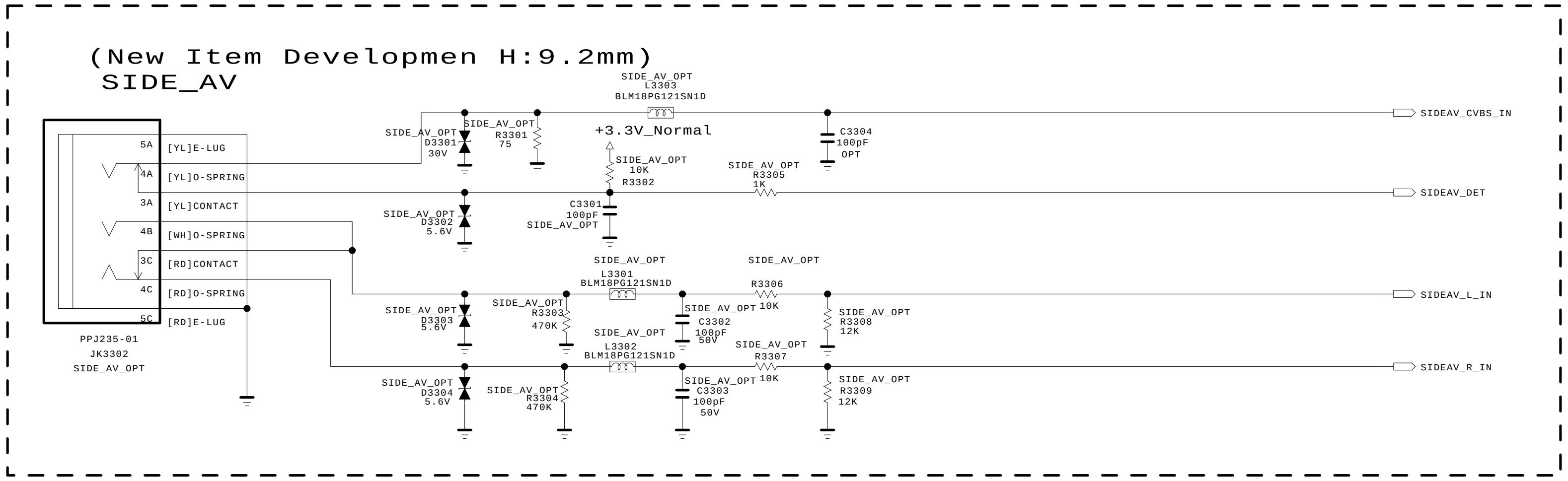


THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	RS232C 9PIN	SHEET	10 /



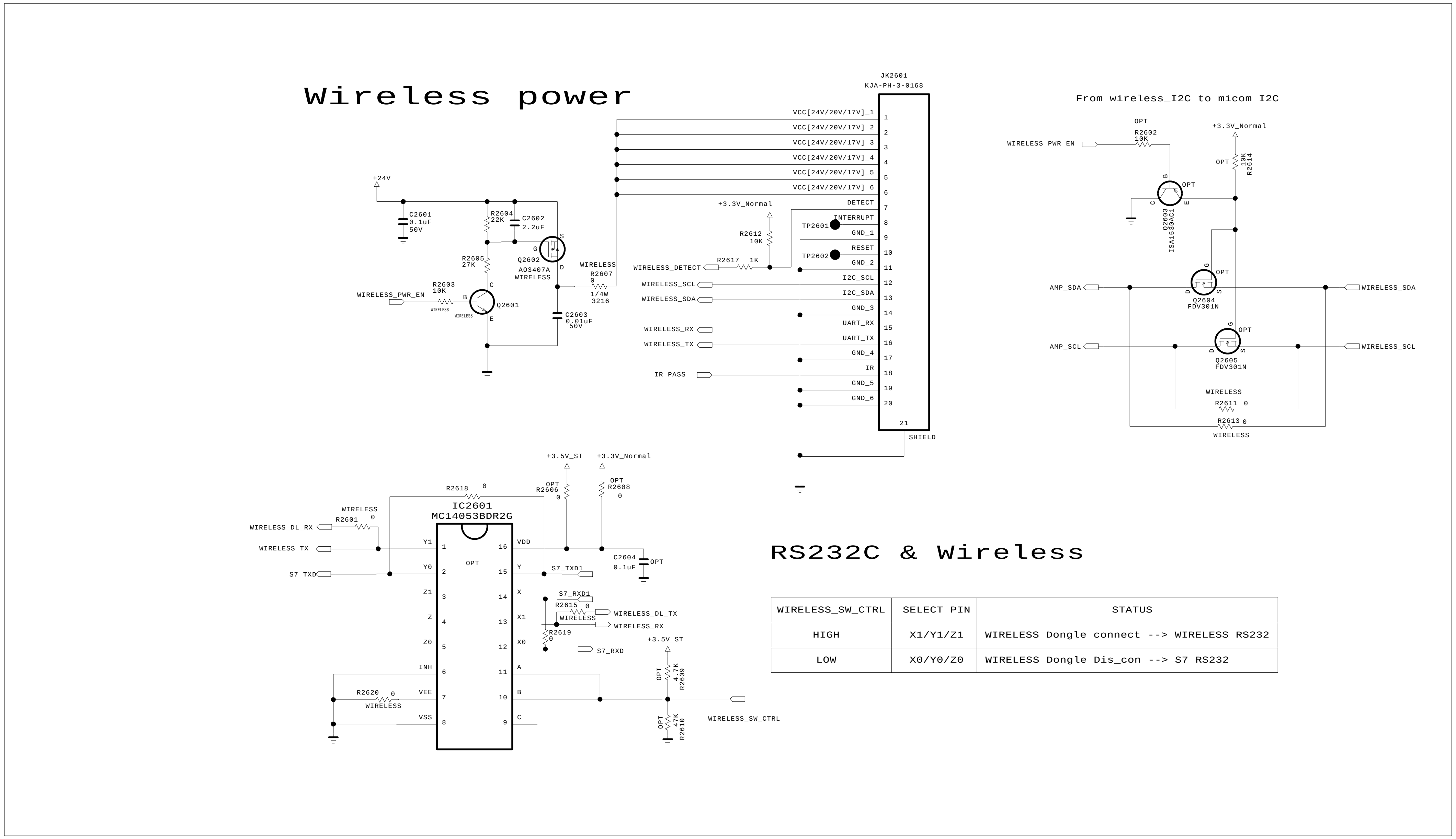
THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LGElectronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	SIDE AV	SHEET	11 /

WIRELESS READY MODEL



WIRELESS_SW_CTRL	SELECT PIN	STATUS
HIGH	X1/Y1/Z1	WIRELESS Dongle connect --> WIRELESS RS232
LOW	X0/Y0/Z0	WIRELESS Dongle Dis_con --> S7 RS232

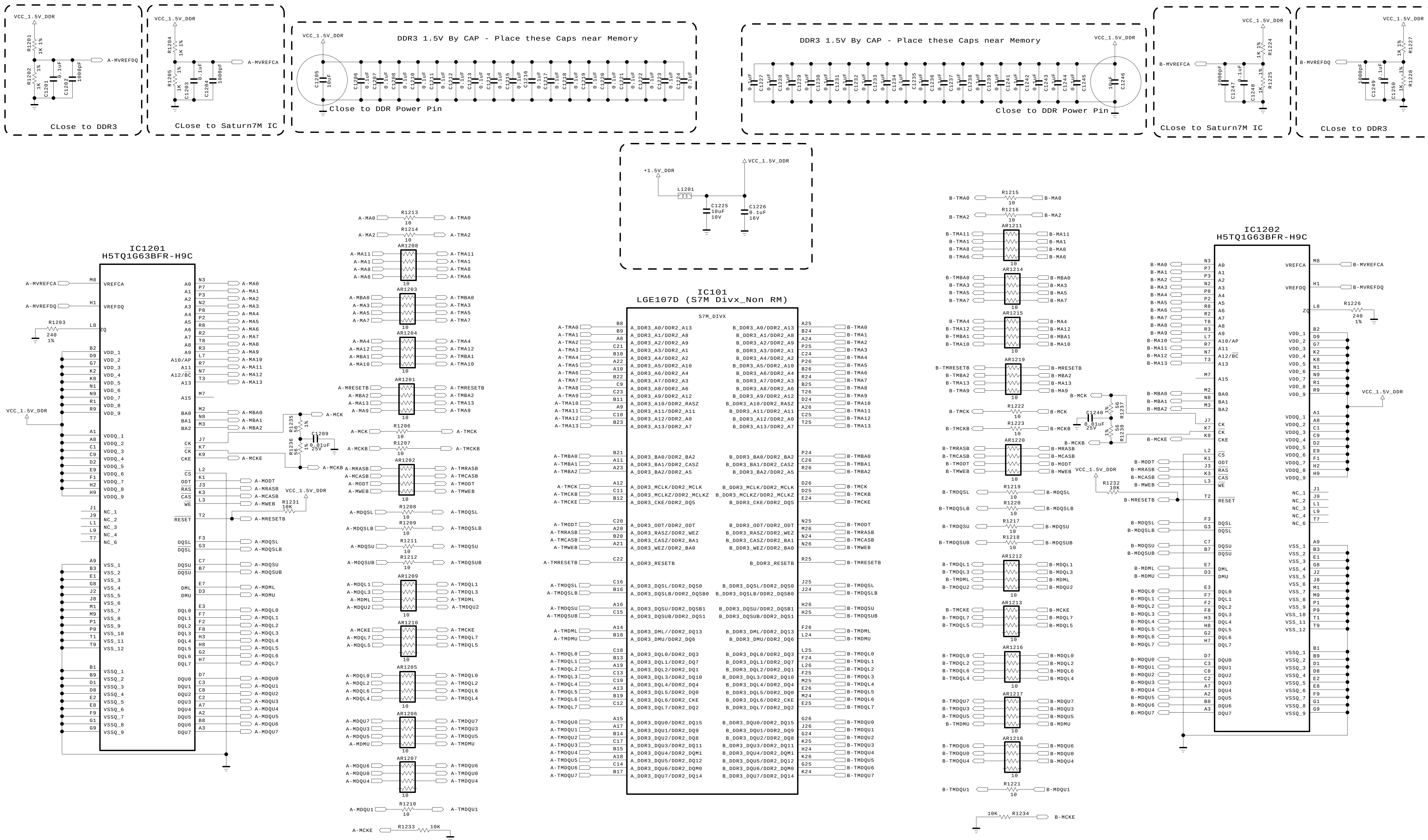
Ver. 1.2 --> 1.3: wireless opt change, 090818, hongsu

THE ⚠ SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFATURES SPECFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE ⚠ SYMBOL MARK OF THE SCHEMETIC.

SECRET
LG Electronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.3
BLOCK	Wireless ready	SHEET	12 /



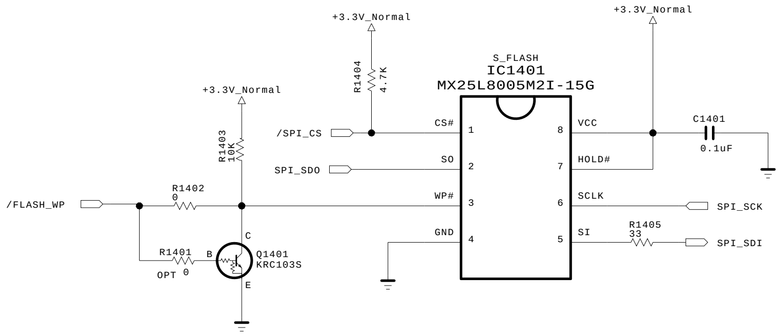
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SECRET

LGElectronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	DDR3(256MB)	SHEET	21 /



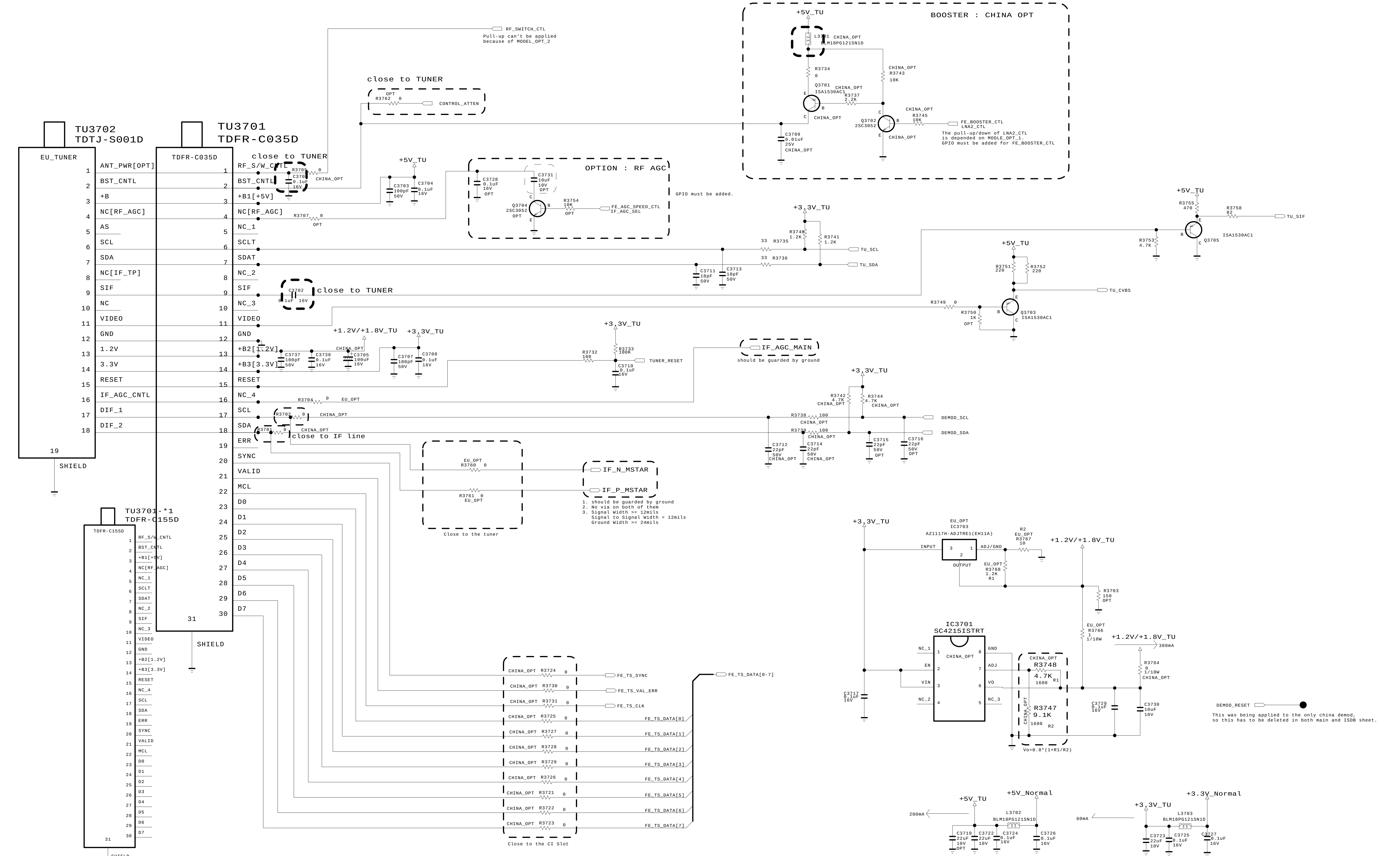
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SECRET
LG Electronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.2
BLOCK	S-Flash(1MB)	SHEET	23 /

LGIT CAN NIM_H/N TUNER for EU & CHINA



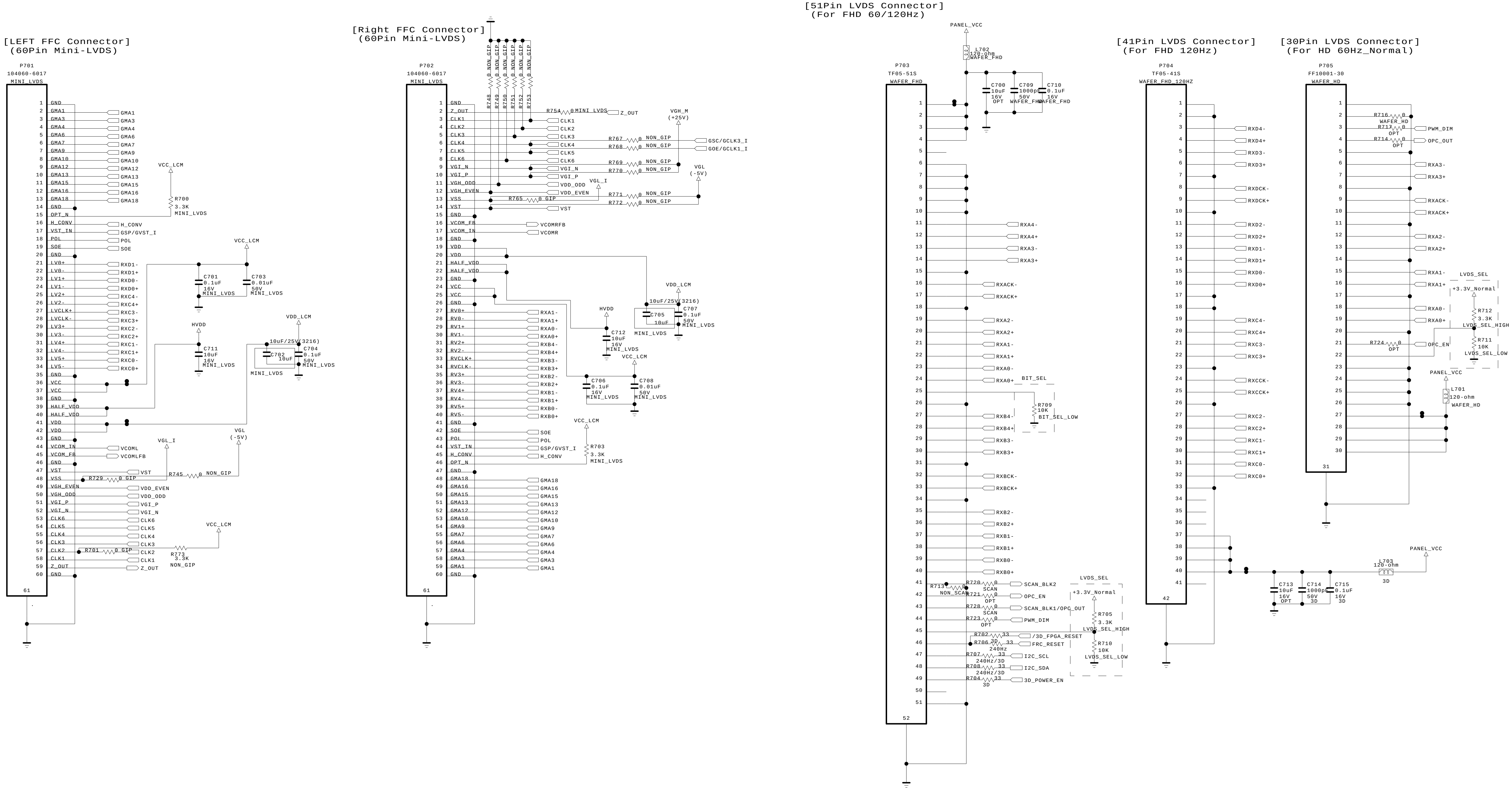
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SECRET

LGElectronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	VER 1.0
BLOCK	EU/CHINA CAN TUNER	SHEET	27

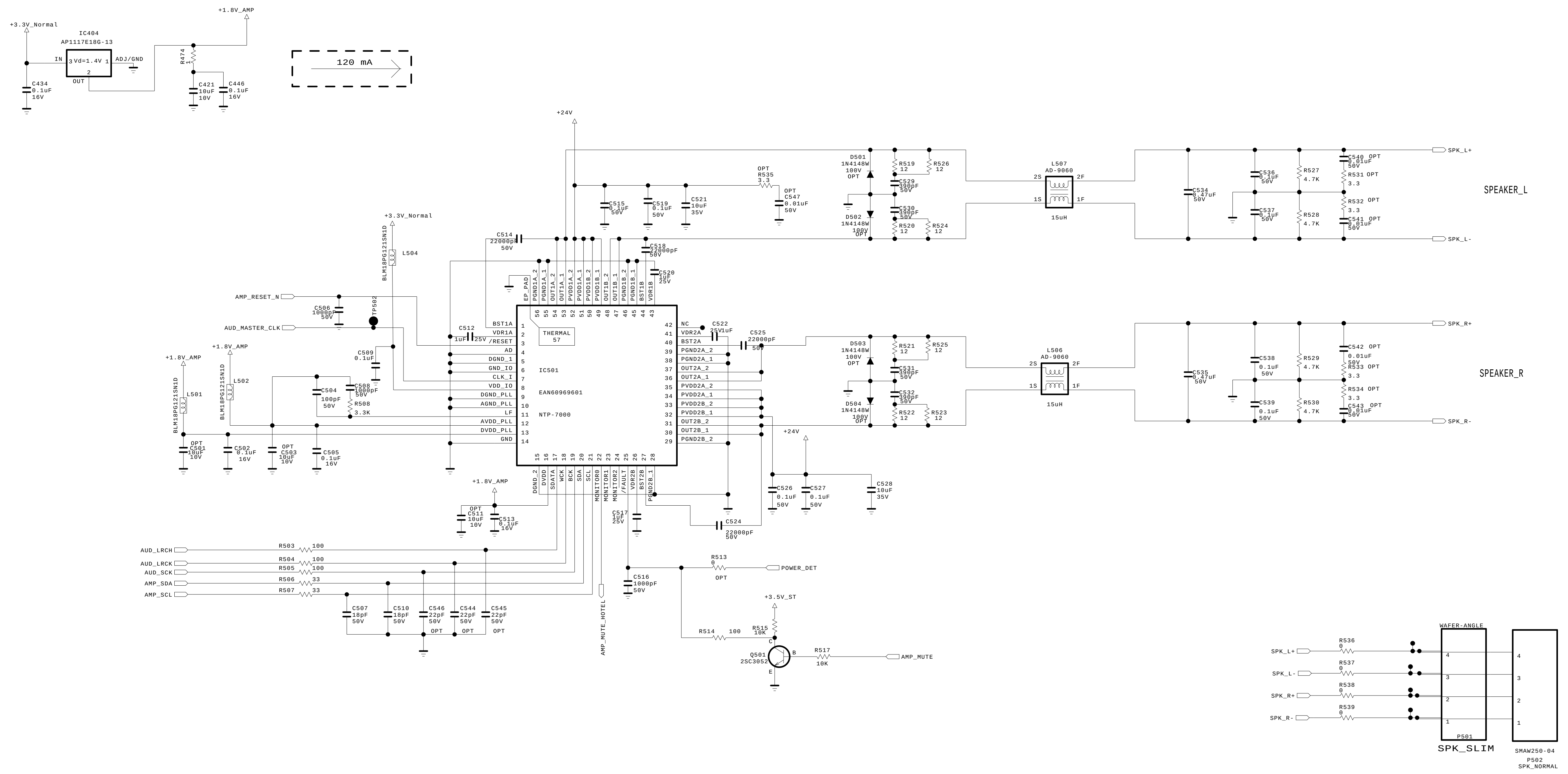


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SECRET
LGElectronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.3
BLOCK	LVDS	SHEET	36 /



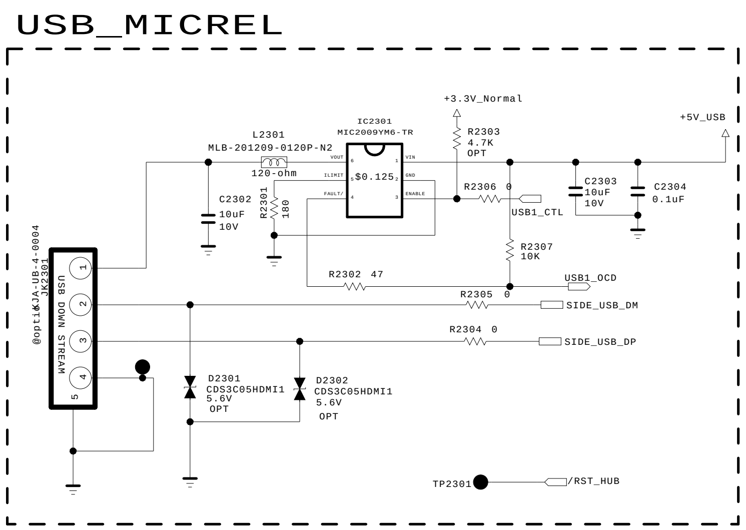
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SECRET
LGElectronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.1
BLOCK	AUDIO[NTP]	SHEET	38 /

USB1 OPTION



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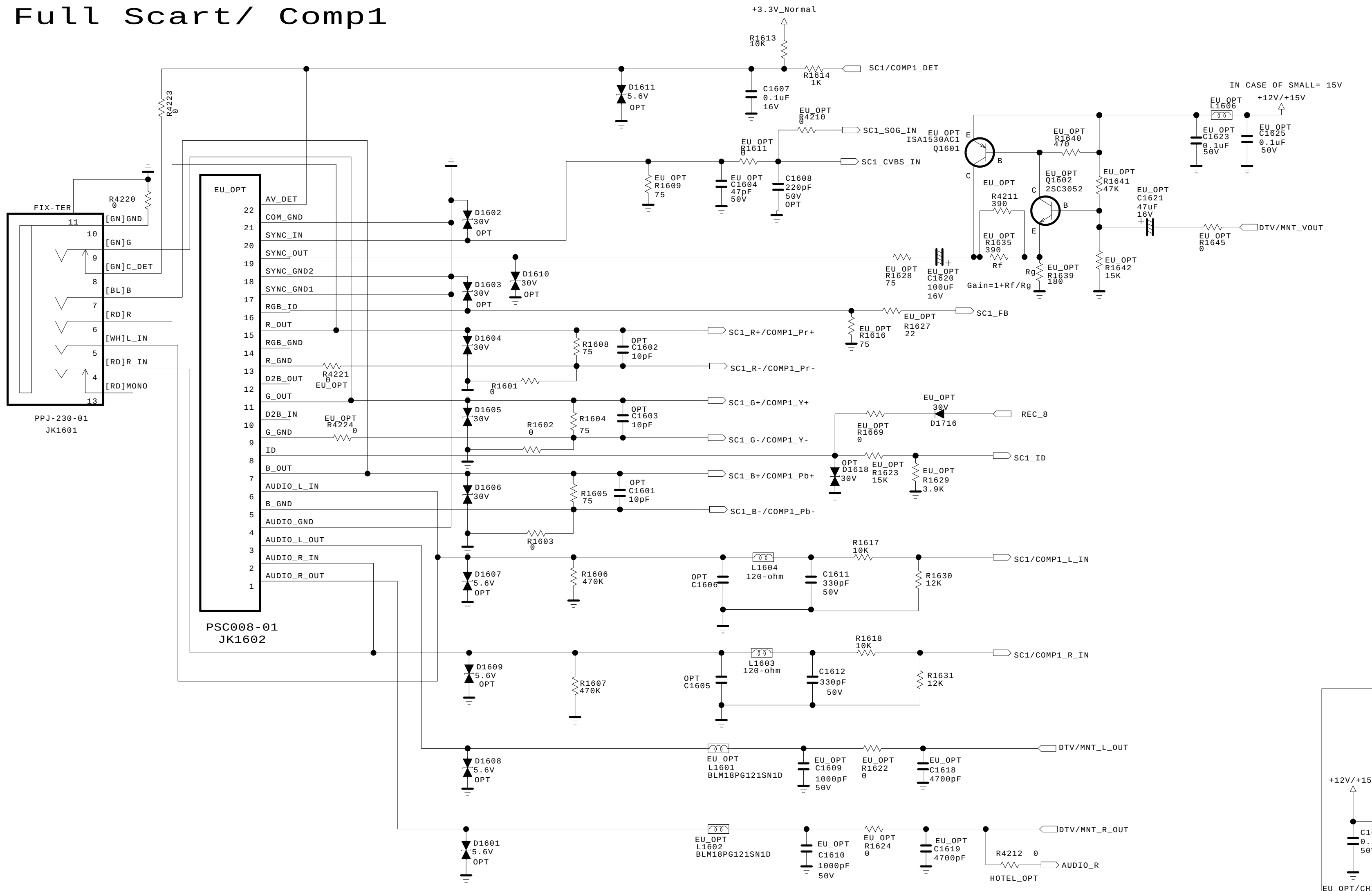
SECRET
LG Electronics

LG ELECTRONICS

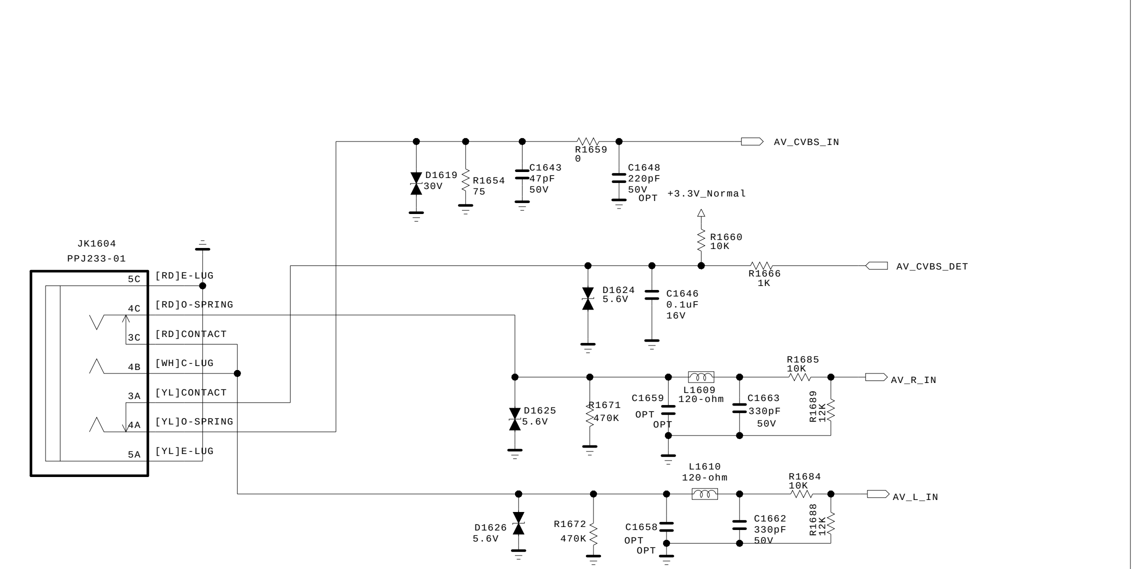
MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	USB	SHEET	39 /

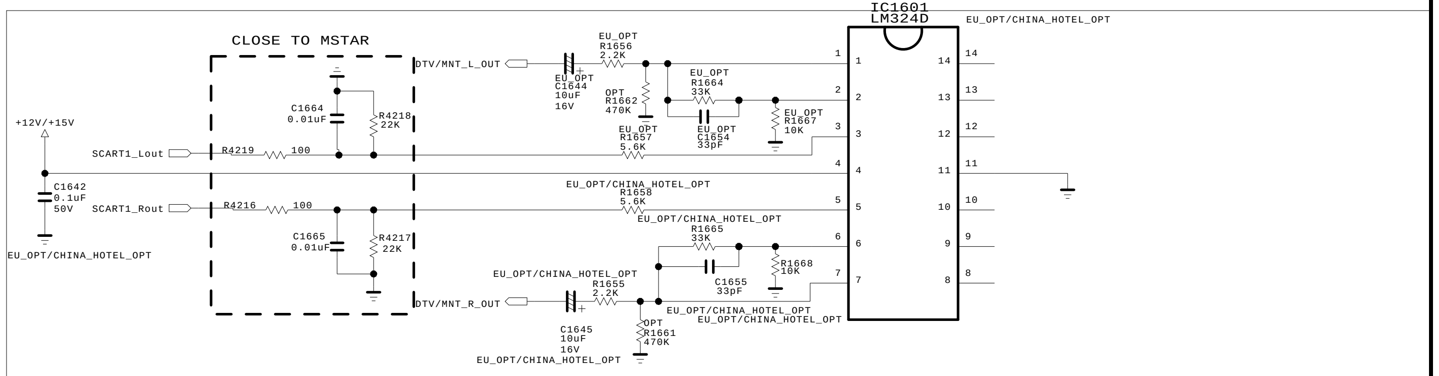
For EU & CHINA

Full Scart/ Comp1



Composite

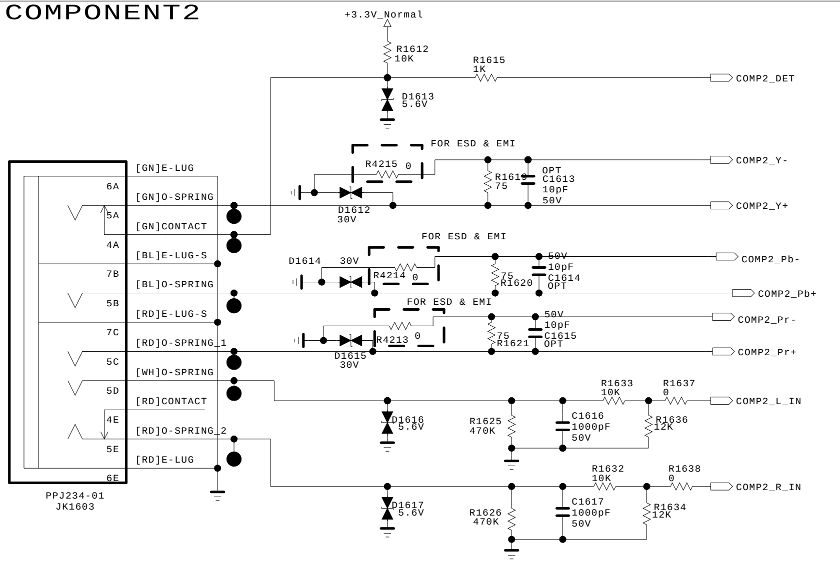




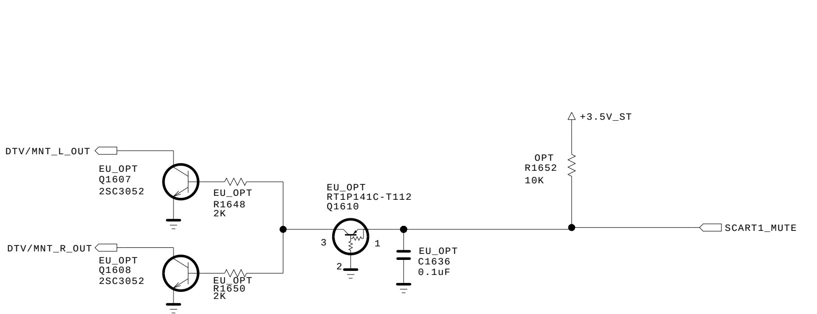
OPTION TABLE

NAME	STATUS
AV_OPT	EU : Not Using China : Using
CHINA_OPT	EU : Not Using China : Using
EU_OPT	EU :Using China:NotUsing

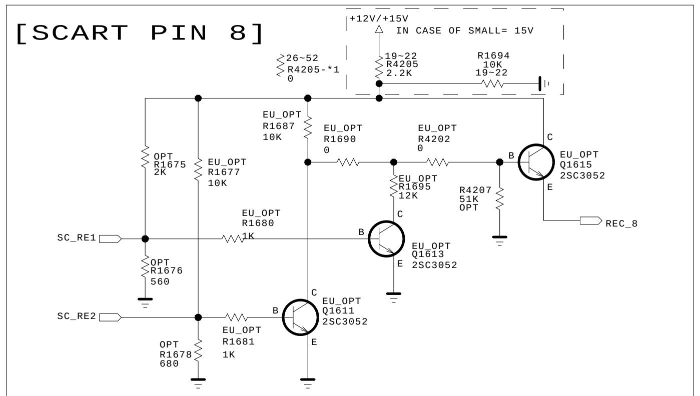
COMPONENT2



[SCART AUDIO MUTE]



[SCART PIN 8]



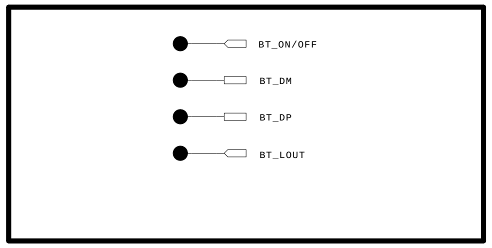
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SECRET
LGElectronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.1
BLOCK	SCART/RCA	SHEET	41

NOT USING B/T



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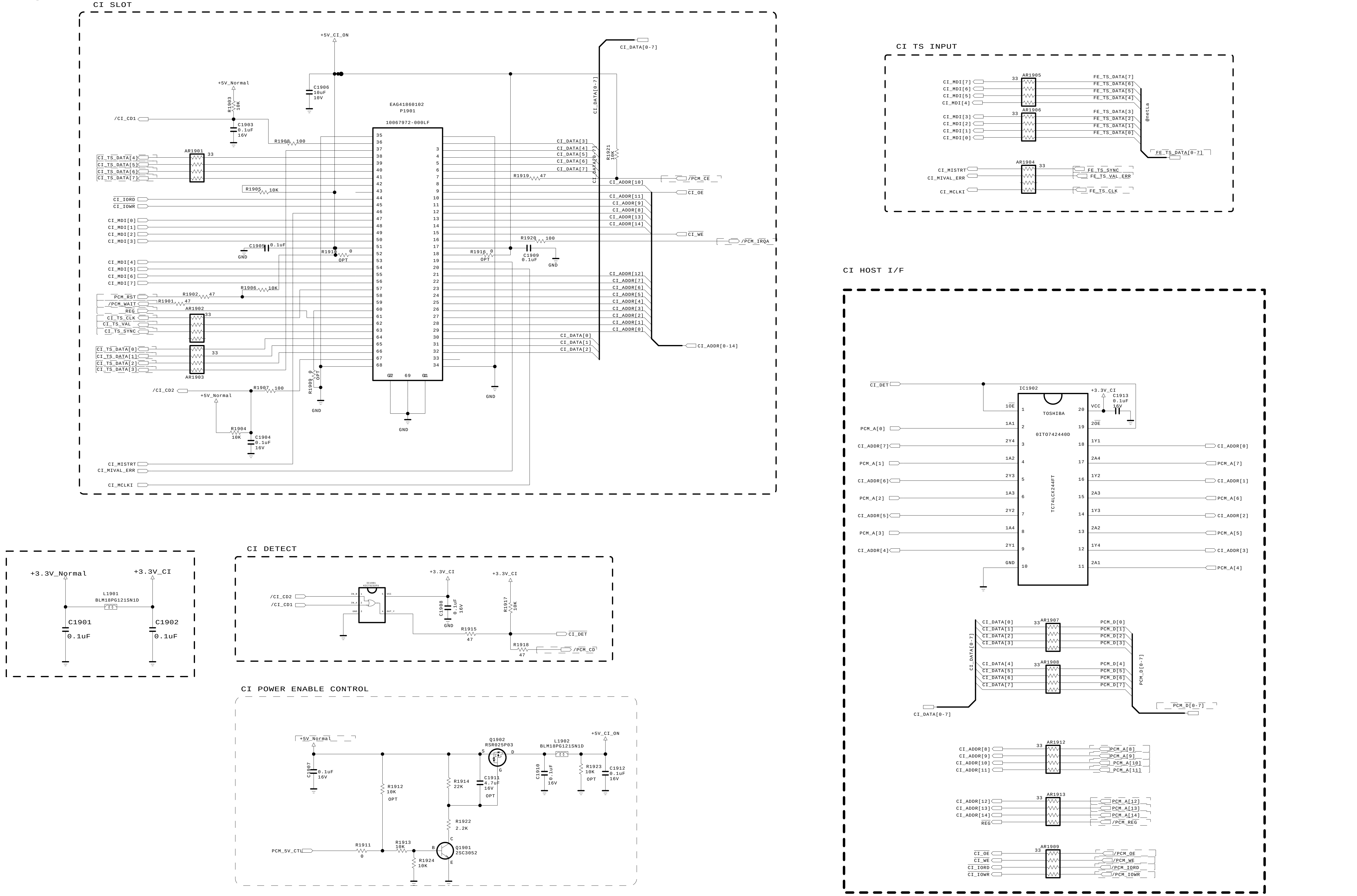
SECRET

LG Electronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	NON B/T	SHEET	44 /

CI Region



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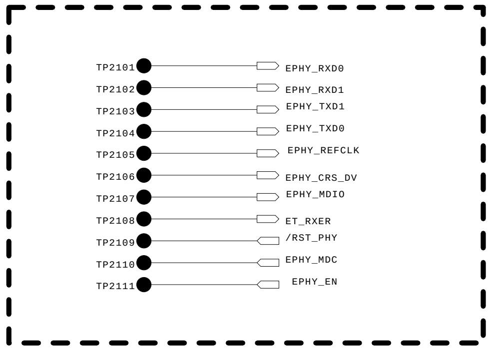
SECRET

LGElectronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	PCMCI	SHEET	45

NON ETHERNET



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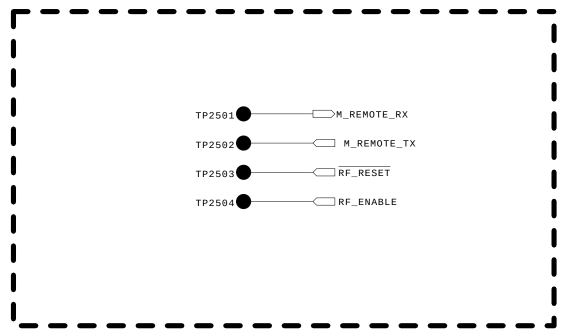
SECRET

LG Electronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	NON ETHERNET	SHEET	48 /

NON Motion Remocon Region



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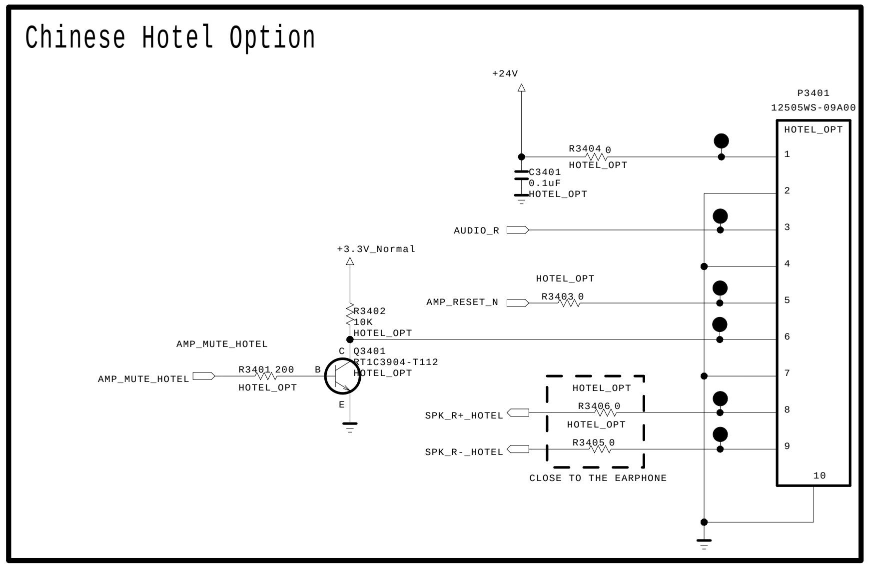
SECRET

LG Electronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	NON M REMOCON	SHEET	50 /

China HOTEL Option

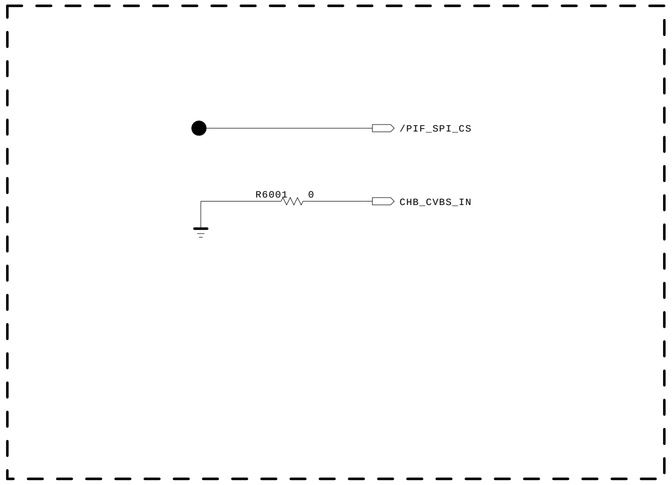


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SECRET
LGElectronics

LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	CHINA HOTEL	SHEET	51 /



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SECRET
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LG ELECTRONICS

MODEL	GP2_Saturn7M	DATE	Ver. 1.0
BLOCK	NON CHB	SHEET	68 /

LG Electronics Inc.